Technical Appendix K

Preliminary Hydrology Calculations

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

FIRST NANDINA LOGISTICS CENTER
SOUTHWEST CORNER OF INDIAN STREET AND NANDINA AVENUE
MORENO VALLEY, CALIFORNIA

CASE NUMBER PA13-0037

PREPARED FOR

FIRST INDUSTRIAL L.P.
898 N. SEPULVEDA BLVD, SUITE 750
EL SEGUNDO, CALIFORNIA 90245
P. (310) 414-5400
FAX (310) 414-5462

OCTOBER 1, 2013

JOB NO. 3190

PREPARED BY

THIENES ENGINEERING
14349 FIRESTONE BLVD.
LA MIRADA, CALIFORNIA 90638
P. (714) 521-4811
FAX. (714) 521-4173

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

FIRST NANDINA LOGISTICS CENTER

PREPARED BY BRIAN WEIL
UNDER THE SUPERVISION OF

REINHARD STENZEL DATE:
R.C.E. 56155
EXP. 12/31/14

INTRODUCTION

A: PROJECT LOCATION

The project site is located at the southwest corner of Indian Street and Nandina Avenue in the City of Moreno Valley. Please see following page for vicinity map.

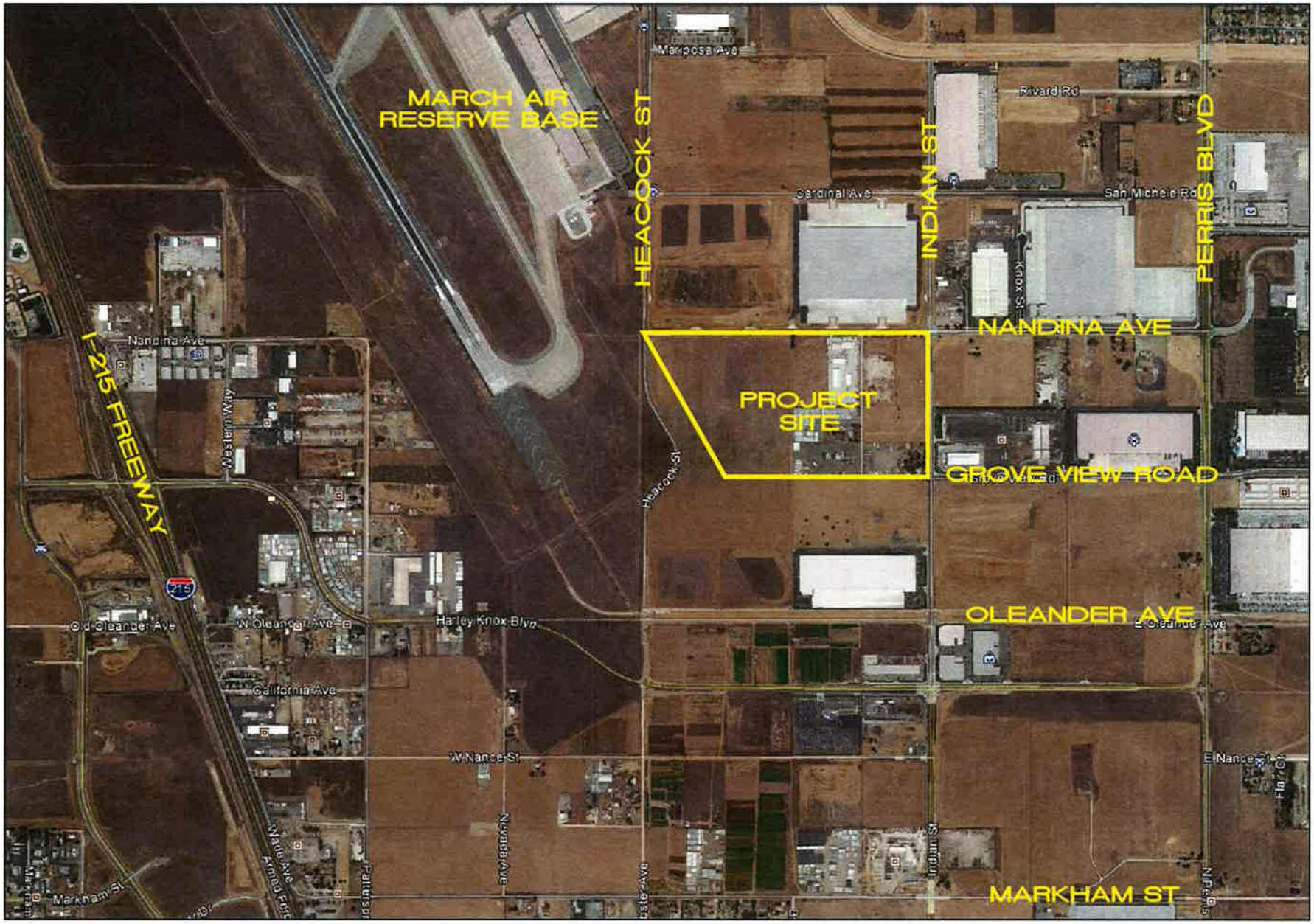
B: STUDY PURPOSE

The purpose of this study is to determine the 100-year peak flow rate from the project site that ultimately drains to the existing storm drain system in Indian Street. Also included is detention analysis which reduces runoff from the proposed development to the capacity of the existing storm drain system.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel
Brian Weil



Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

"VICINITY MAP"

FOR

FIRST INDUSTRIAL LOGISTICS - PHASE III

N

NOT TO SCALE

DISCUSSION

Project Description

The proposed project site encompasses approximately 74.5 acres. Improvements to the project site include one warehouse type building of 1,388,000 square feet. There will be truck loading/unloading areas north and south of the building. Vehicle parking lots will be located east and west of the building. There will be two water quality swales along the easterly property line fronting Indian Street. At the southeast corner of the project site there will be a water quality basin. The westerly portion of the site fronting Heacock Street will remain undeveloped. The remainder of the site will be used for landscaping.

FEMA Flood Zone

The project site is located within Flood Zones "X" (shaded) and "X" (unshaded). Flood Zone "X" (shaded) is described as "areas of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. Are also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile." Flood Zone "X" (unshaded) is described as "area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. See Appendix "A" for a portion of the FIRM map depicting the project site.

Albert Webb Master Drainage Plan and Hydrology Map

The "Perris Valley Master Drainage Plan Lateral B-3 Stage-2" and the "Perris Valley MDP Lateral B-3 Hydrology Map" were prepared by Albert A. Webb Associates and approved by the City of Moreno Valley. The Master Drainage Plan shows an existing 5 ft by 10 ft reinforced concrete box in Indian Street where the project site is tabled to, with two lateral stubs designed to accept runoff from the site. Per the Hydrology Map, the capacity of each stub is 39.9 cfs and 42.6 cfs, respectively, for a total of 82.5 cfs.

Existing Conditions

Currently, there are several small industrial buildings and a paved parking lot covering a portion of the project site. The remainder of the site is an undeveloped dirt lot. The site generally surface drains easterly to Indian Street. The 100-year existing condition peak flow rate for the project site is approximately 75.3 cfs.

Please see Appendix "B" for existing condition hydrology calculations and Appendix "E" for existing condition hydrology map.

Proposed Conditions

Runoff from the north half of the proposed building, the northerly truck yard, the westerly parking lot, and a portion of the westerly dirt lot (Nodes 110-122) drain to catch basins in the northerly truck yard. The runoff is then conveyed southerly via a proposed onsite storm drain to the water quality basin. The 100-year peak flow rate for this area is approximately 71.2 cfs (undetained).

Runoff from the south half of the proposed building, the southerly truck yard, and the westerly drive aisle (Nodes 100-105) drain to catch basins in the southerly truck yard. The runoff is then conveyed easterly via a proposed onsite storm drain to the water quality basin. The 100-year peak flow rate for this area is approximately 62.9 cfs (undetained).

Runoff tributary to the water quality basin from the above mentioned areas drains via a proposed storm drain to an existing 5 ft by 10 ft reinforced concrete box in Indian Street (Node 123). The 100-year peak flow rate draining from the water quality basin to the existing R.C.B. is approximately 126.9 cfs (undetained).

Runoff from the westerly dirt lot fronting Heacock Street (Node 200-202) will drain south-easterly to a proposed C.M.P. riser, where a proposed storm drain (separate from the remainder of the site) will convey this runoff to the existing R.C.B. in Indian Street. The 100-year peak flow rate for this area is approximately 8.9 cfs.

Runoff from the easterly vehicle parking lot (Nodes 300-303) drains to water quality swales along the easterly property line. A proposed storm drain carries this runoff to the existing R.C.B. in Indian Street. The 100-year peak flow rate for this area is approximately 7.6 cfs.

The total proposed condition 100-year peak flow rate for the entire site is approximately 143.4 cfs undetained (126.9 + 8.9 + 7.6).

Please see Appendix "C" for proposed condition hydrology calculations and Appendix "E" for proposed condition hydrology map.

Detention

The proposed condition runoff of 143.4 cfs is greater than the allowable 82.5 cfs per the Albert Webb Master Drainage Plan and Hydrology Map. The peak flow rate is higher than the Webb hydrology since the entire site was not tabled to the storm drain in Indian Avenue. Detention in the northerly and southerly truck yards is utilized to reduce proposed condition discharge to the allowable amount.

Hydrographs and detention at the truck yards were computed for 1-hour, 3-hour, 6- hour, and 24-hour events at 2-year, 5-year, 10-year and 100-year return frequencies. The

highest proposed condition discharge at the northerly truck yard is 23.5 cfs (100-year 1-hour event) with a ponding depth of 0.83 ft (W.S.E. = 1469.88). For the southerly truck yard, the highest proposed condition discharge is 35.9 cfs (100-year 1-hour event) with a ponding depth of 1.13 ft (W.S.E. = 1467.80).

With detention, the total proposed condition 100-year discharge for the entire site is approximately 77.1 cfs (23.5 cfs northerly truck yard + 35.9 southerly truck yard + 7.6 cfs easterly swales + 1.2 cfs south-easterly basin + 8.9 cfs westerly dirt lot). This is less than the allowable discharge rate of 82.5 cfs.

Please see Appendix "A" for the Albert Webb hydrology map and Appendix "D" for hydrographs and detention calculations.

Methodology

Rational Method program (by AES Software) for Riverside County was used for the hydrology calculations. The soil type is "C" for portions of the project site and "B" for the remainder of the site per the Riverside County Hydrology Manual. (Soil type for each drainage area is indicated on the hydrology map.)

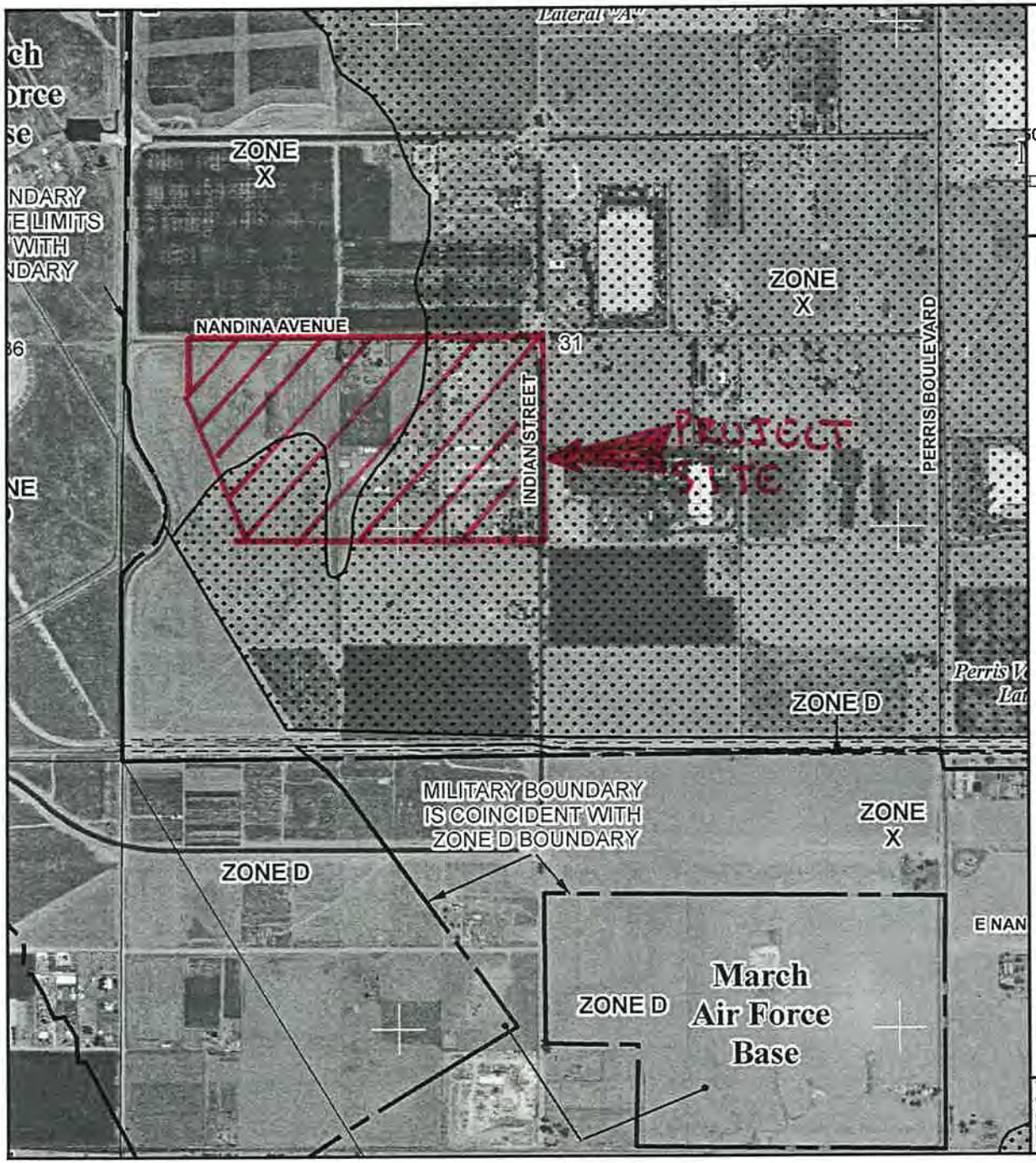
Hydrographs were computed using CivilD Software's Unit Hydrograph program. For the proposed condition unit hydrographs, a lag time of "0" was used to yield the highest possible peak flow rate for a conservative analysis of detention in the truck yards.

Please see Appendix "A" for reference materials.

APPENDIX	DESCRIPTION
A	REFERENCE MATERIALS
B	EXISTING CONDITION HYDROLOGY CALCULATIONS
C	PROPOSED CONDITION HYDROLOGY CALCULATIONS
D	DETENTION CALCULATIONS
E	HYDROLOGY MAP

APPENDIX A

REFERENCE MATERIALS



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1430G

FIRM

FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 1430 OF 3805
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MORENO VALLEY, CITY OF	065074	1430	G
PERRIS, CITY OF	060258	1430	G
RIVERSIDE COUNTY	060245	1430	G

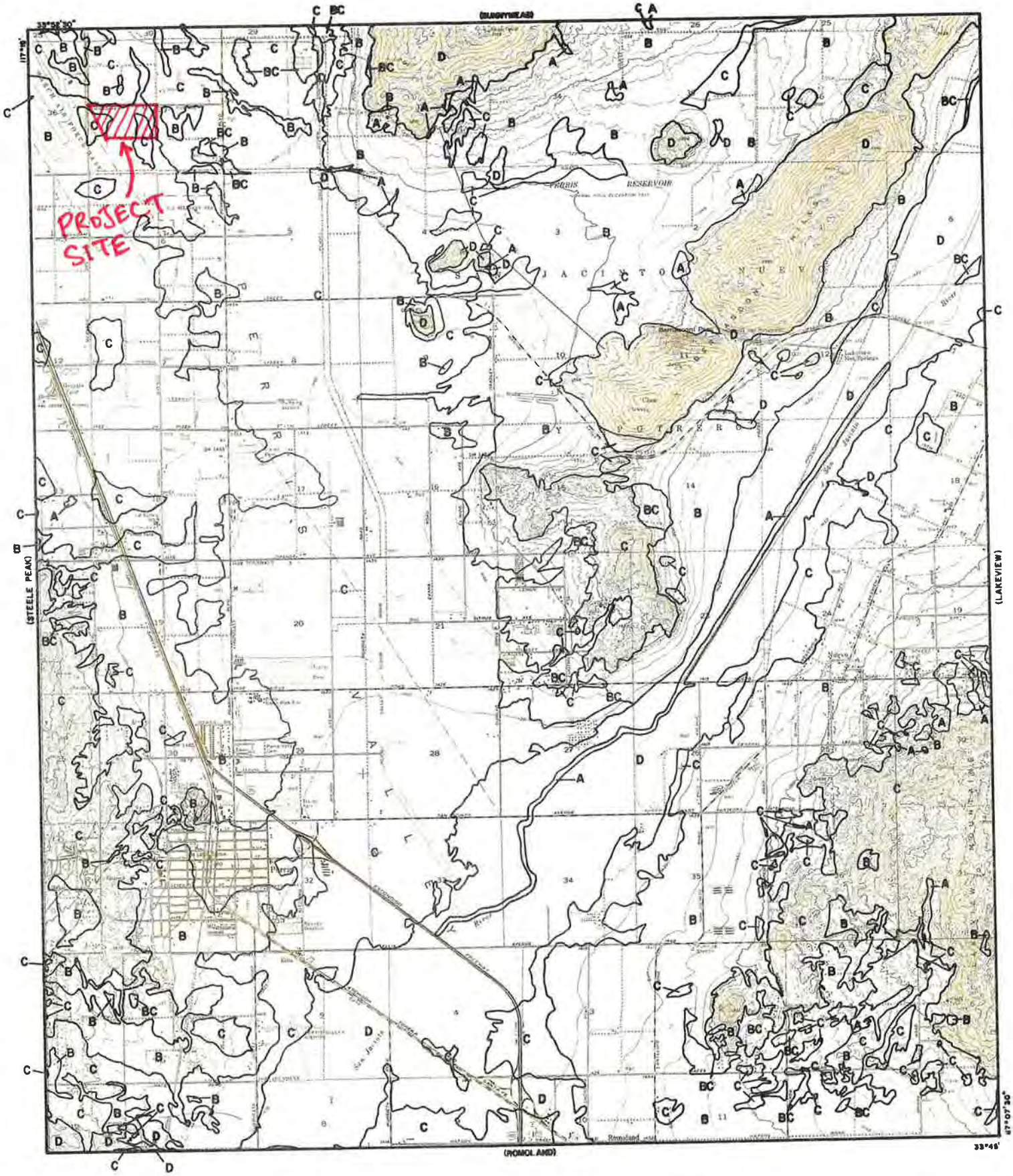
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
06065C1430G

EFFECTIVE DATE
AUGUST 28, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

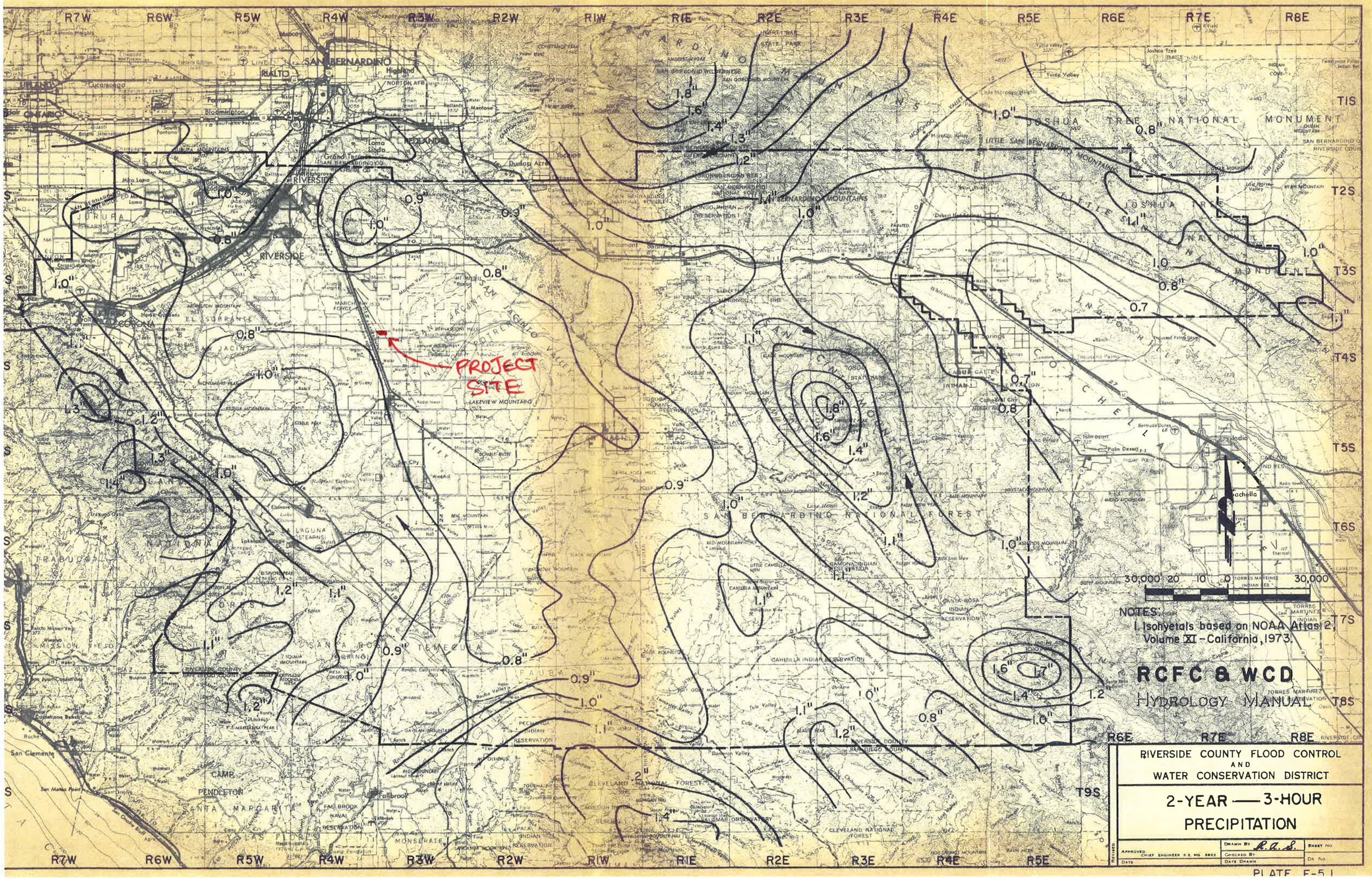
HYDROLOGY MANUAL

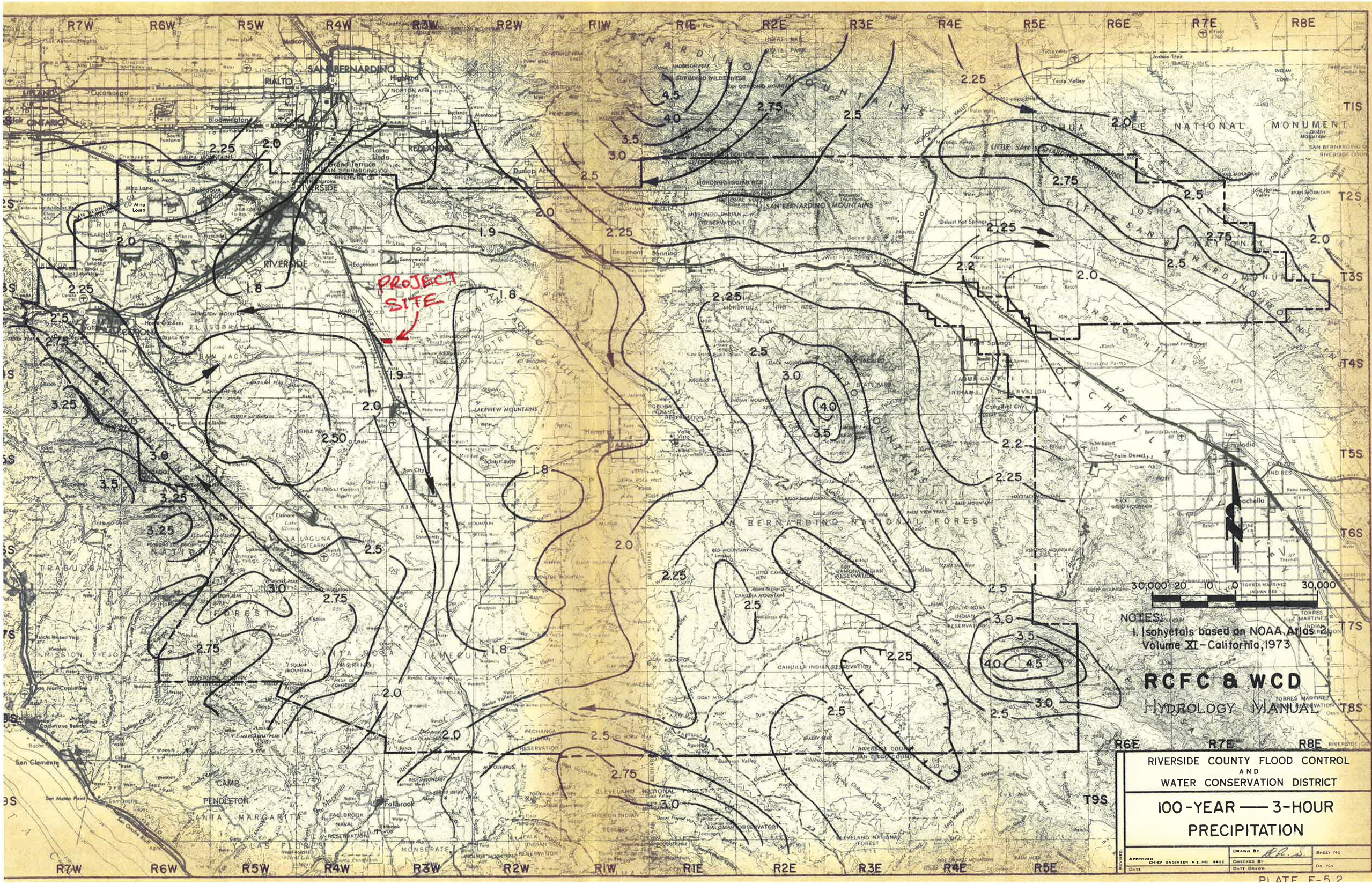
N

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR PERRIS

PLATE C-1.30


PROJECT SITE
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 3-HOUR PRECIPITATION
DRAWN BY R.A.S.
CHECKED BY
DATE DRAWN
SHEET NO
DR NO
APPROVED CHIEF ENGINEER R.E. NO 8882
DATE
REVISED
PLATE E-5.1


R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S
SAN BERNARDINO
RIALTO
ONTARIO
Ontario
Fontana
Bloomington
Highland
NORTON AFB
Mentone
REDLANDS
Loma Linda
Grand Terrace
RIVERSIDE
Mira Loma
JURUPA
Rubidoux
Edgemont
Sunnymead
Moreno
Beaumont
Banning
Dunlap Acres
MORONGO INDIAN RES
SAN BERNARDINO MOUNTAINS
MORONGO INDIAN RESERVATION
JOSHUA TREE NATIONAL MONUMENT
Yucca Valley
Joshua Tree
Desert Hot Springs
Palm Springs
Cabazon
Indio
Coachella
Bermuda Dunes
Palm Desert
Thermal
TORRES MARTINEZ INDIAN RES
SAN BERNARDINO NATIONAL FOREST
CAHUILLA INDIAN RESERVATION
SANTA ROSA INDIAN RESERVATION
LAKEVIEW MOUNTAINS
PROJECT SITE
EL SOBRANTE
SAN JACINTO
LA LAGUNA
TRABUCO
MISSION VIEJO
TEMECULA
PAUBA
PECHANGA INDIAN RESERVATION
RIVERSIDE COUNTY
SAN DIEGO COUNTY
CLEVELAND NATIONAL FOREST
SALSMAN OBSERVATORY
Fallbrook
PENDLETON
CAMP
SANTA MARGARITA
MONSERATE
San Clemente
San Mateo Point
30,000 20 10 0 30,000
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 3-HOUR PRECIPITATION
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DATE
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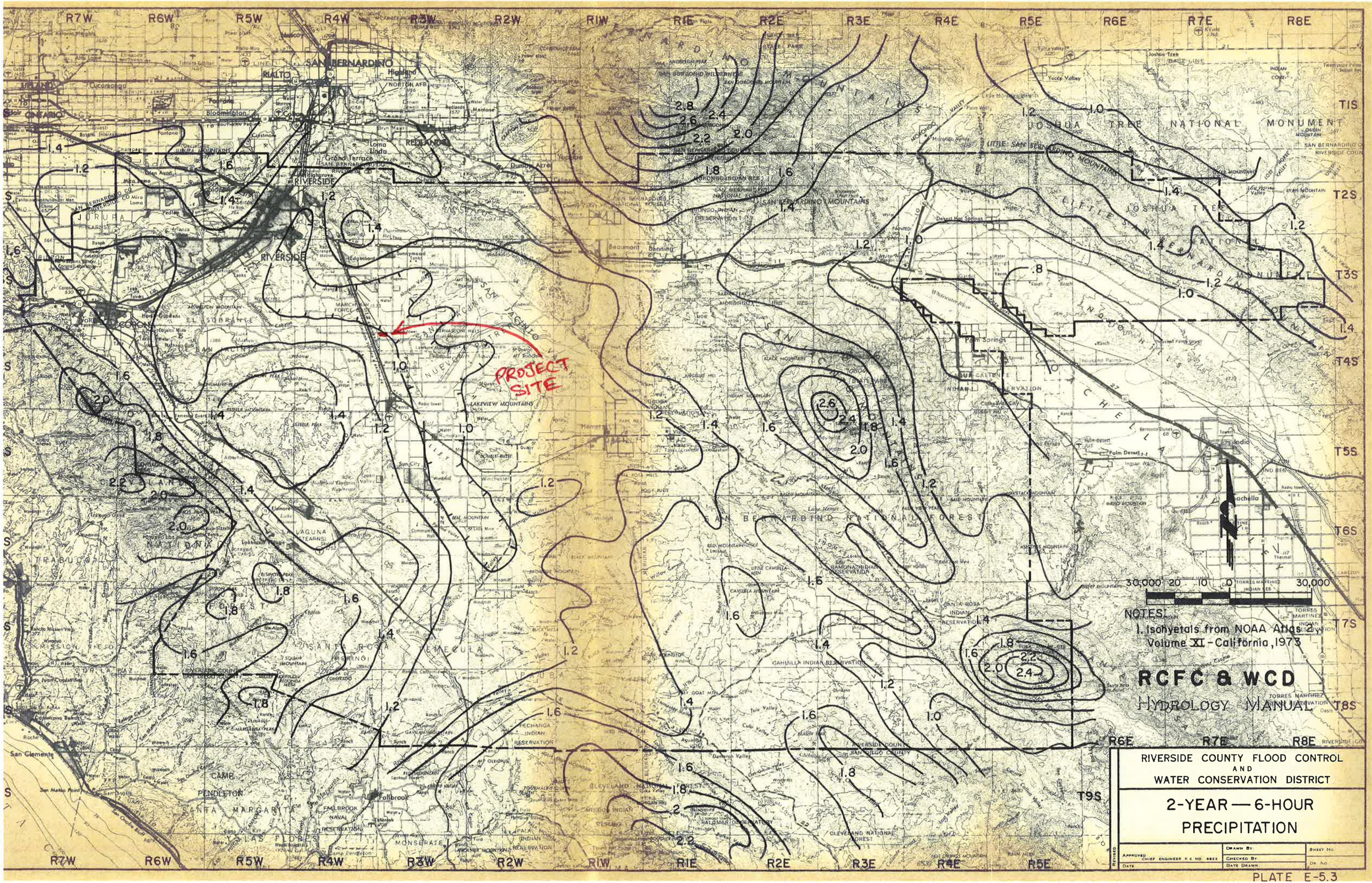
DATE DRAWN
SHEET NO
DR. NO
REVISED

PLATE E-5.2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RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 6-HOUR PRECIPITATION
30,000 20 10 0 30,000
R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E
T1S T2S T3S T4S T5S T6S T7S T8S T9S
SAN BERNARDINO
RIVERSIDE
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
PALM SPRINGS
INDIO
Fallbrook
CAMP PENDLETON
PLATE E-5.3

PROJECT SITE
SAN BERNARDINO
RIALTO
RIVERSIDE
REDLANDS
Loma Linda
Grand Terrace
Mira Loma
Bloomington
Fontana
Ontario
Upland
Rancho Cucamonga
Highland
Mentone
Beaumont
Banning
Sunnymead
Moreno
Hemet
San Jacinto
Perris
Lake Elsinore
Corona
Temecula
Fallbrook
San Clemente
Palm Springs
Desert Hot Springs
Palm Desert
Indio
Coachella
Yucca Valley
Joshua Tree
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO MOUNTAINS
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
CAHUILLA INDIAN RESERVATION
SANTA ROSA INDIAN RESERVATION
TORRES MARTINEZ INDIAN RESERVATION
CAMP PENDLETON
FALLBROOK NAVAL RESERVATION
LAKEVIEW MOUNTAINS
SAN JACINTO MOUNTAINS
SANTA ROSA MOUNTAINS
RIVERSIDE COUNTY
SAN DIEGO COUNTY
R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E
T1S T2S T3S T4S T5S T6S T7S T8S T9S
30,000 20 10 0 30,000
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 6-HOUR PRECIPITATION
APPROVED CHIEF ENGINEER R.E. NO. 8832
DATE
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DATE DRAWN
SHEET NO
DR. NO
REVISED

R7W
R6W
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R2E
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R6E
R7E
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T5S
T6S
T7S
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PROJECT SITE
SAN BERNARDINO
RIALTO
RIVERSIDE
Fontana
Bloomington
Loma Linda
Grand Terrace
Highgrove
Beaumont
Banning
Palm Springs
Desert Hot Springs
Indio
Coachella
Fallbrook
San Clemente
Elsinore
Lake Elsinore
CAMP PENDLETON
SAN BERNARDINO MOUNTAINS
SAN JACINTO MOUNTAINS
SAN BERNARDINO NATIONAL FOREST
JOSHUA TREE NATIONAL MONUMENT
CAHUILLA INDIAN RESERVATION
CLEVELAND NATIONAL FOREST
30,000 20 10 0 30,000
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR PRECIPITATION
APPROVED CHIEF ENGINEER R.E. NO. 6822
DATE
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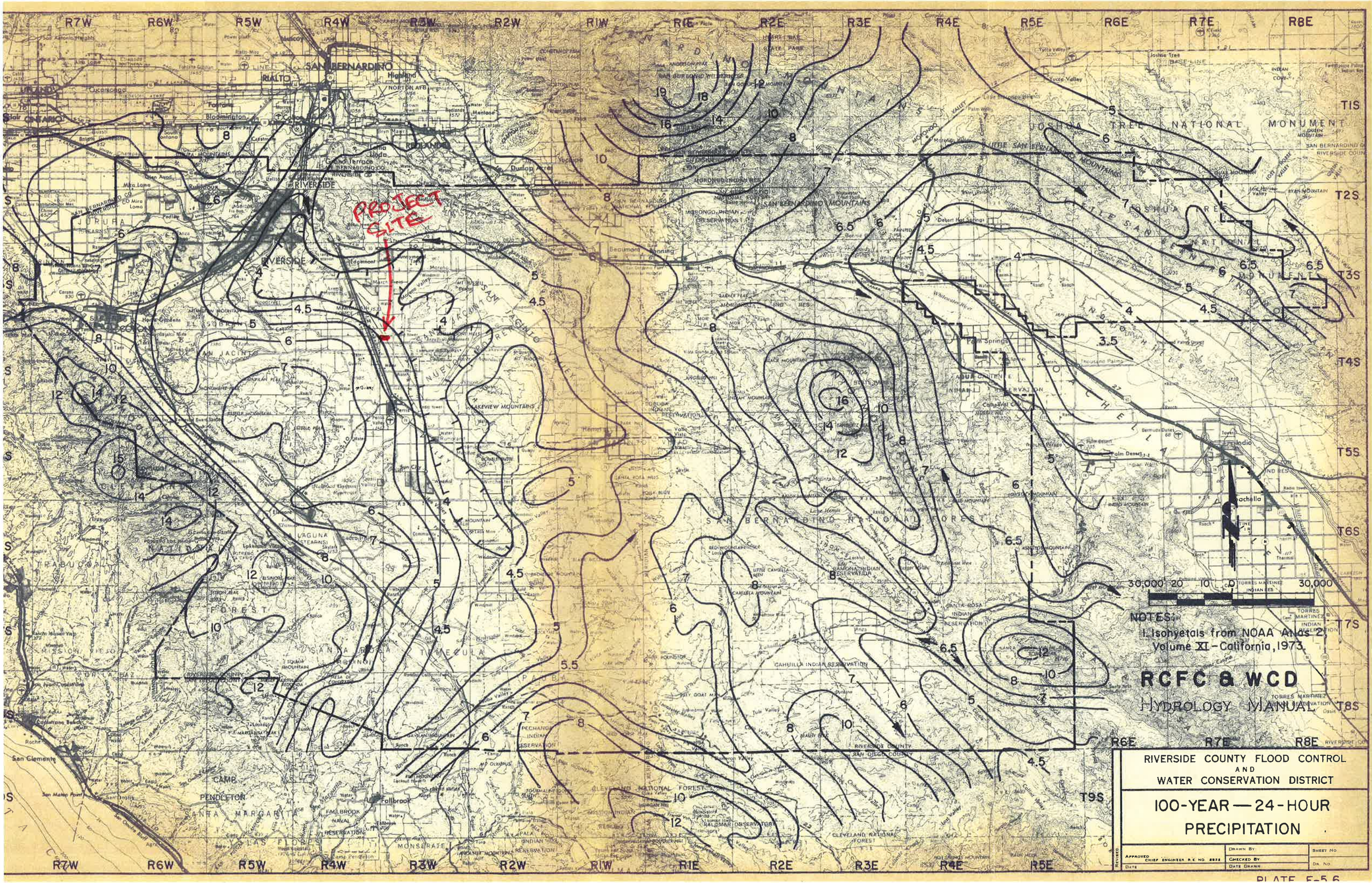
PLATE E-5.5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SAN BERNARDINO
RIALTO
RIVERSIDE
Ontario
Fontana
Bloomington
Colton
Mira Loma
Corona
Beaumont
Banning
Perris
Hemet
Sun City
Menifee
Temecula
Murrieta
Fallbrook
San Clemente
Palm Springs
Indio
Coachella
Desert Hot Springs
Joshua Tree
Yucca Valley
Twentynine Palms
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO MOUNTAINS
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
CAHUILLA INDIAN RESERVATION
AGUA CALIENTE INDIAN RESERVATION
SANTA ROSA INDIAN RESERVATION
RAMONA INDIAN RESERVATION
PECHANGA INDIAN RESERVATION
PALA INDIAN RESERVATION
MORONGO INDIAN RESERVATION
SOBOBA INDIAN RESERVATION
TORRES MARTINEZ INDIAN RESERVATION
CAMP PENDLETON
FALLBROOK NAVAL RESERVATION
LAKEVIEW MOUNTAINS
SAN JACINTO MOUNTAINS
SAN JACINTO VALLEY
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NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR PRECIPITATION
APPROVED CHIEF ENGINEER R.E. NO. 8828
DATE
DRAWN BY
CHECKED BY
DATE DRAWN
SHEET NO
DR. NO
REVISED

PLATE E-5.6

R7W
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SAN BERNARDINO
RIALTO
RIVERSIDE
CORONA
REDLANDS
Highland
Grand Terrace
Loma Linda
Mira Loma
Jurupa
Edgemont
Sunnymead
Moreno
Beaumont
Banning
Perris
Lake Elsinore
Temecula
Fallbrook
San Clemente
Palm Springs
Desert Hot Springs
Indio
Coachella
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
CAMP PENDLETON
MARCH AIR FORCE BASE
PROJECT SITE
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NOTES:
1. Slope of Intensity-Duration Curve based on District analysis of automatic recording rain gage records.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
SLOPE OF INTENSITY DURATION CURVE
DRAWN BY R.A.S.
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DATE DRAWN
SHEET NO
DR NO
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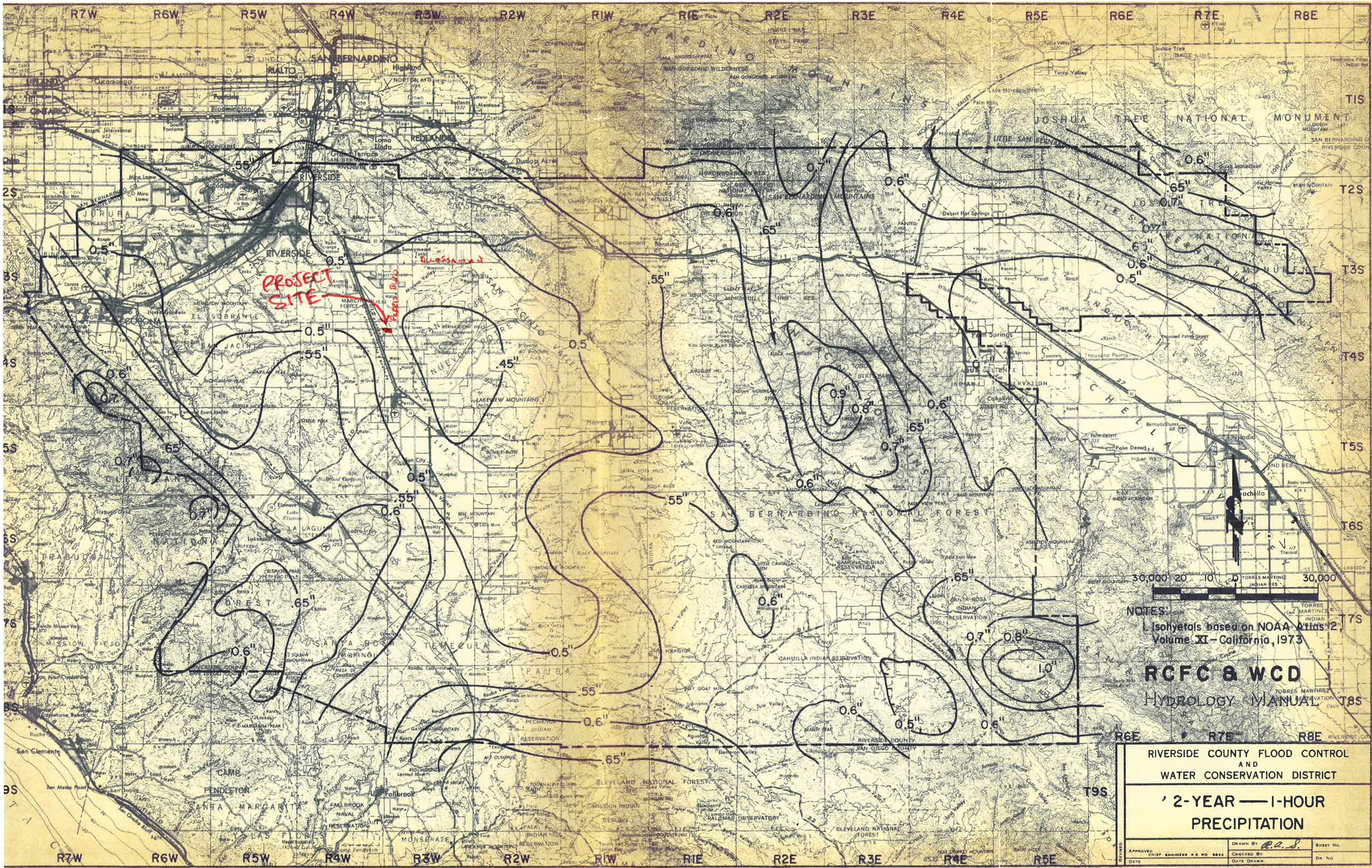
DATE
REVISED

PLATE D-4.6



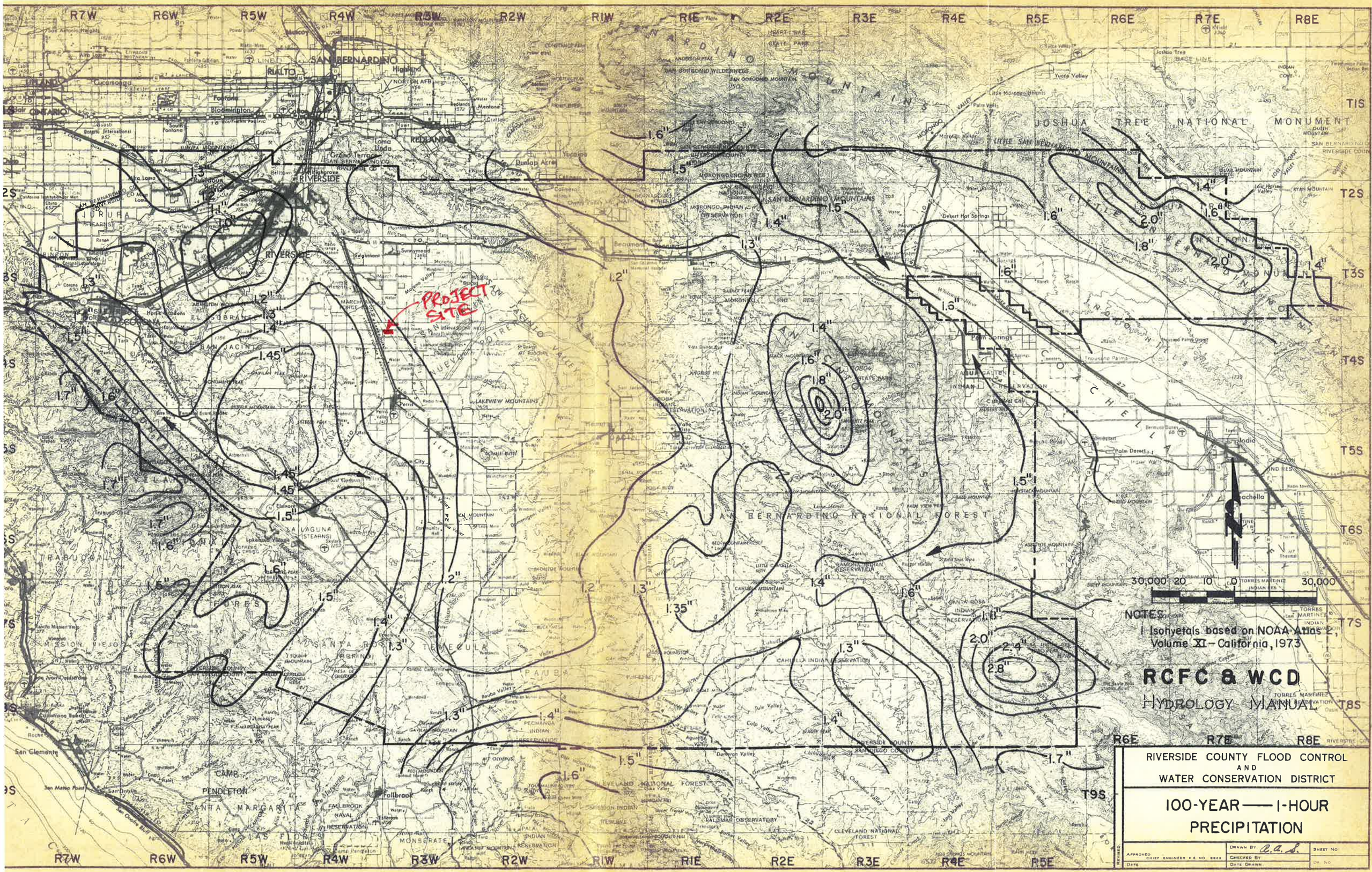
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

2-YEAR — 1-HOUR PRECIPITATION

APPROVED: CHIEF ENGINEER R.E. NO. 8822	DRAWN BY: R.A.S.	SHEET NO.
DATE	CHECKED BY:	DR. NO.
	DATE DRAWN:	

REVISED

PLATE D-4,3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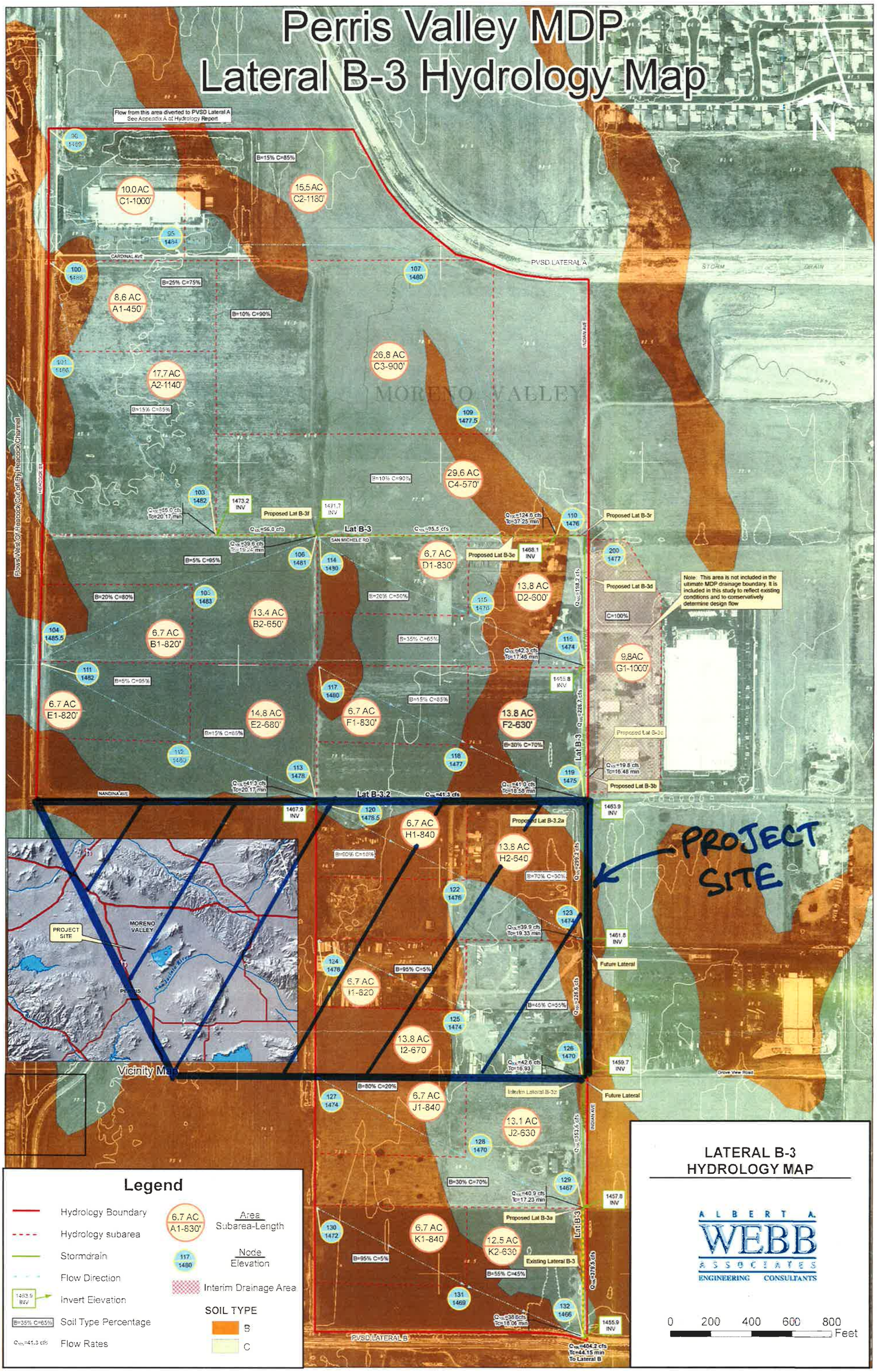
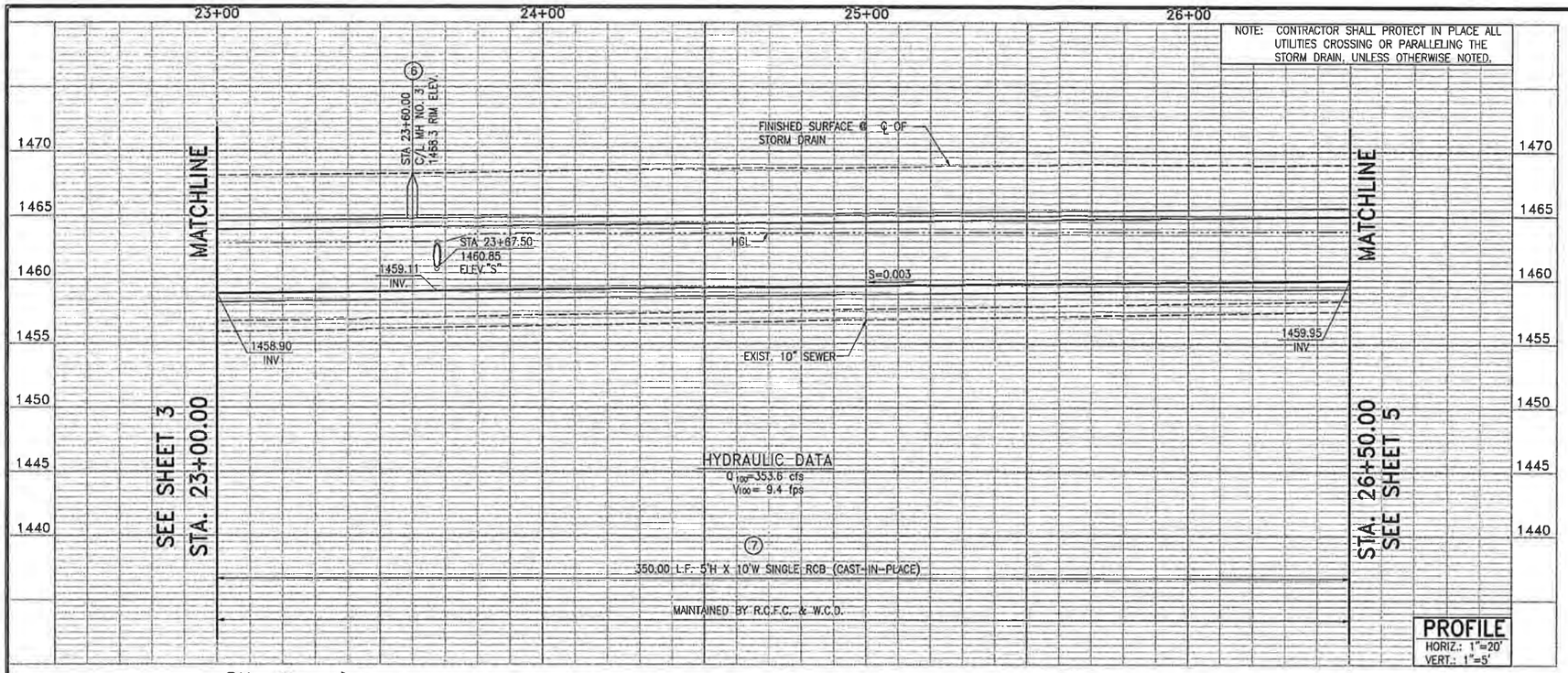
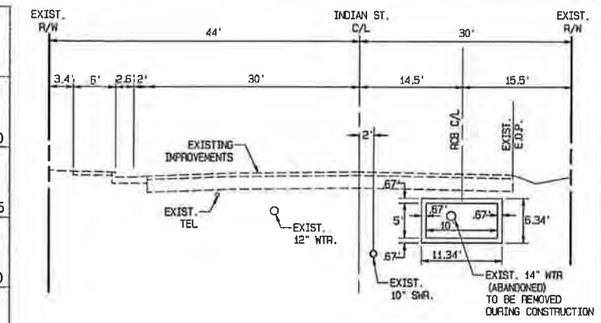
T8S
T9S
SAN BERNARDINO
RIALTO
RIVERSIDE
REDLANDS
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO MOUNTAINS
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
PROJECT SITE
1.6"
1.5"
1.4"
1.3"
1.2"
1.1"
1.0"
1.45"
1.7"
1.8"
2.0"
2.4"
2.8"
1.35"
30,000 20 10 0 30,000
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR PRECIPITATION
DRAWN BY
CHECKED BY
DATE DRAWN
SHEET NO
DR. NO
APPROVED
CHIEF ENGINEER R.E. NO. 8823
DATE
REVISED

Perris Valley MDP
Lateral B-3 Hydrology Map



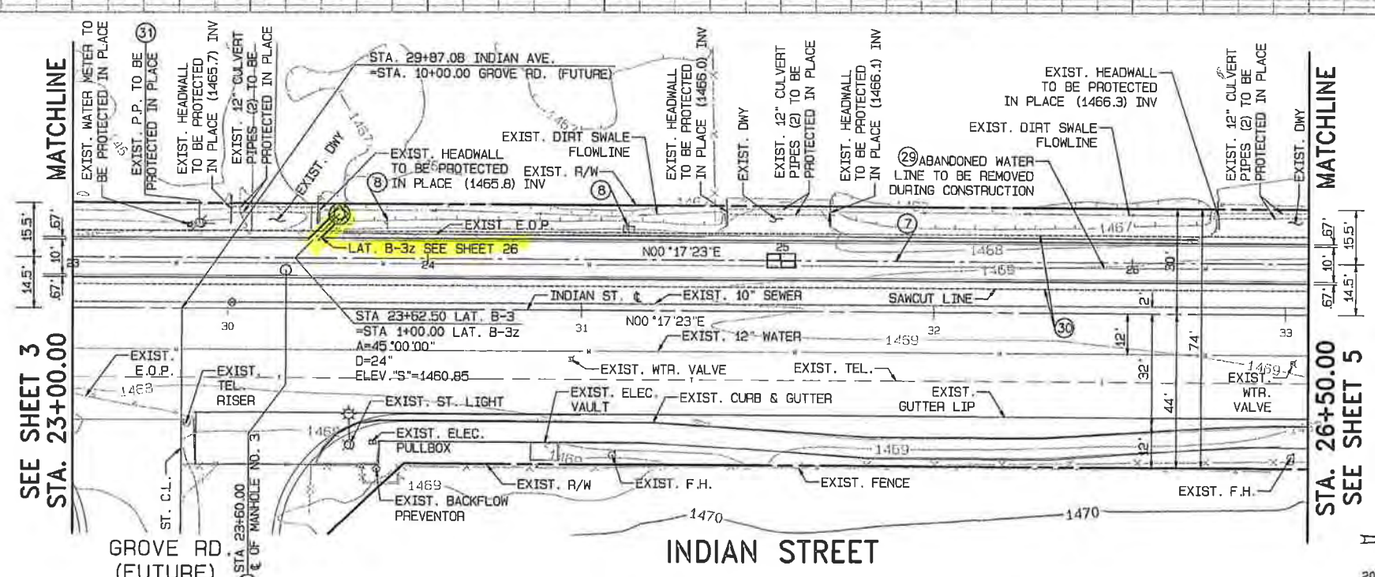


PROFILE
HORIZ.: 1"=20'
VERT.: 1"=5'



SECTION AT STA. 25+00.00
TYPICAL FROM STA. 24+00.00 TO STA. 26+50.00

10' 0 10'



PLAN

CONSTRUCTION NOTES

⑥ CONSTRUCT MANHOLE NO. 3 PER RCFC&WCD STD. DWG. MH253

⑦ CONSTRUCT 5'H x 10'W SINGLE CELL RCB (CAST-IN PLACE) PER CALTRANS STD. NO. D80

⑧ REMOVE AND REPLACE EXISTING SIGN

㉙ ABANDONED WATER LINE TO BE REMOVED DURING CONSTRUCTION

㉚ TRENCH BACKFILL AND ROADWAY REPAIR PER CITY OF MORENO VALLEY STD. NO. 602 AND DETAIL ON SHEET 27

㉛ EXISTING POWER POLE TO BE PROTECTED IN PLACE

AS BUILT
APPROVED BY: [signature]
DATE 11 Feb 09

LSW

G:\2006\06-0146\DWG&PRO\06-0146-LAT-B-3.pro 11/9/2007

Don't Dig...Until You Call U.S.A. Toll Free 1-800-227-2600 for the location of buried utility lines. Don't disrupt vital services.
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK: ELEVATION = 1484.22
COUNTY OF RIVERSIDE B.M. M-30. AT THE INTERSECTION OF PERRIS BOULEVARD AND OLEANDER (BRIDGE #5309): 24.0 FEET WEST OF PERRIS BOULEVARD: 5.5 FEET SOUTH OF THE NORTHERLY END OF A 12 INCH x 48 FOOT CONCRETE HEADWALL: A BRASS DISK SET IN THE TOP OF A CONCRETE HEADWALL AND MARKED M-30 1963.

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

REGISTERED PROFESSIONAL ENGINEER — RICHARD CHRISTIAN CORNELL — NO. C67239 EXP. 9-30-08 — CIVIL — STATE OF CALIFORNIA

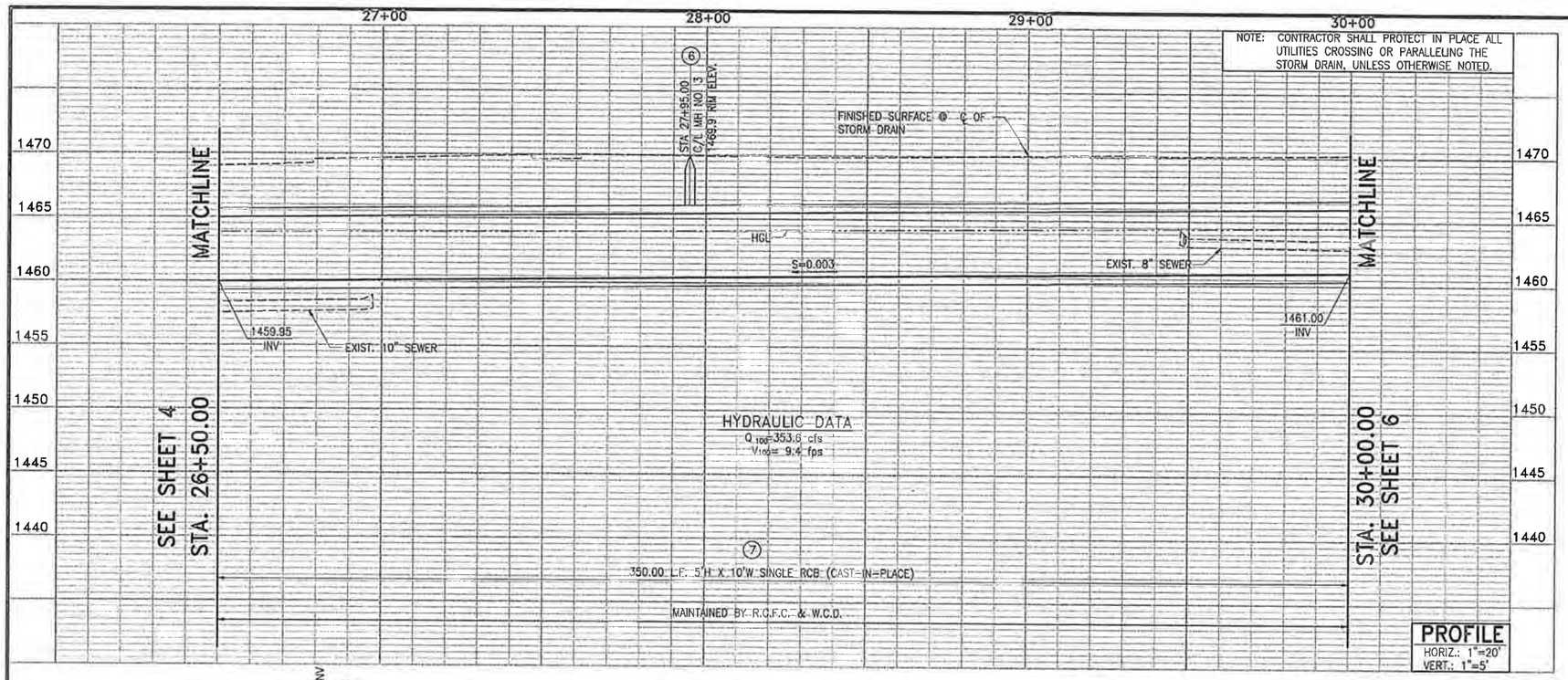
ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET, RIVERSIDE, CA. 92506
PH. (951) 686-1070 FAX (951) 788-1256
PREPARED BY: [signature] DATE: 11/9/07
R.C.E. NO. C67239 EXP. DATE 9-30-08
DESIGNED BY: JC
DRAWN BY: RR
CHECKED BY: JC

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED BY: [signature] DATE: 1/9/08
APPROVED BY: [signature] DATE: 1-10-2008

CITY OF MORENO VALLEY APPROVALS
PREM KUMAR, ASSISTANT CITY ENGINEER — DATE 12/10/07
R.C.E. C52483 (EXP. 12/31/08)
CHRIS A. VOGT, CITY ENGINEER — DATE 12/12/07
R.C.E. C44250 (EXP. 6/30/09)

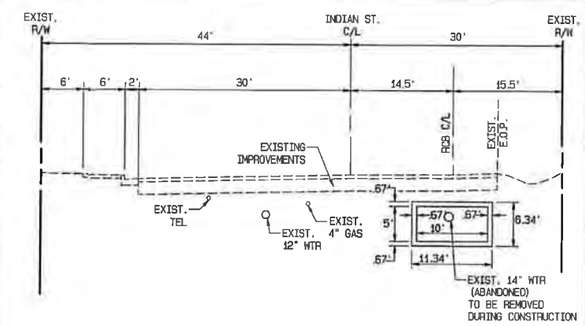
PERRIS VALLEY MASTER DRAINAGE PLAN
LATERAL B-3 STAGE-2
STA. 23+00.00 – STA. 26+50.00

PROJECT NO. 4-0-00526
DRAWING NO. 4-948
SHEET NO. 4 OF 28



PROFILE

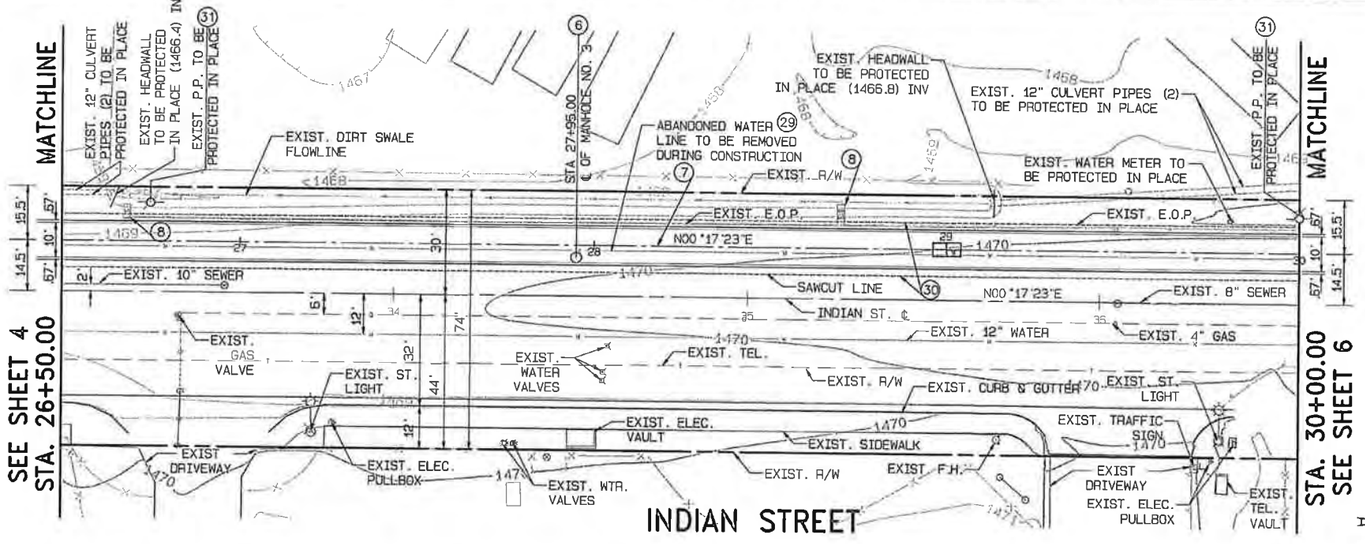
HORIZ.: 1"=20'
VERT.: 1"=5'



SECTION AT STA. 29+00.00

TYPICAL FROM STA. 26+50.00 TO STA. 30+00.00

10' 0 10'



PLAN

10' 0 10'

CONSTRUCTION NOTES

(6) CONSTRUCT MANHOLE NO. 3 PER RCFC&WCD STD. DWG. MH253

(7) CONSTRUCT 5'H x 10'W SINGLE CELL RCB (CAST-IN-PLACE) PER CALTRANS STD. NO. D80

(8) REMOVE AND REPLACE EXISTING SIGN

(29) ABANDONED WATER LINE TO BE REMOVED DURING CONSTRUCTION

(30) TRENCH BACKFILL AND ROADWAY REPAIR PER CITY OF MORENO VALLEY STD. NO. 602 AND DETAIL OF SHEET 27

(31) EXISTING POWER POLE TO BE PROTECTED IN PLACE

AS BUILT
APPROVED BY: [signature]
DATE 11 Feb 09

Don't Dig...Until You Call U.S.A. Toll Free
1-800-227-2600
for the location of buried utility lines.
Don't disrupt vital services.
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK: ELEVATION = 1464.22
COUNTY OF RIVERSIDE B.M. M-30. AT THE INTERSECTION OF PERRIS BOULEVARD AND OLEANDER (BRIDGE #53O9): 24.0 FEET WEST OF PERRIS BOULEVARD: 5.5 FEET SOUTH OF THE NORTHERLY END OF A 12 INCH x 48 FOOT CONCRETE HEADWALL: A BRASS DISK SET IN THE TOP OF A CONCRETE HEADWALL AND MARKED M-30 1963.

REF.	REVISIONS / DESCRIPTION	APPR.	DATE

ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET, RIVERSIDE, CA. 92506
PH. (951) 686-1070 FAX (951) 788-1256
PREPARED BY: [signature] DATE: 13 Nov 07
R.C.E. NO. C67239 EXP. DATE 9-30-08
DESIGNED BY: JC
DRAWN BY: RR
CHECKED BY: JC

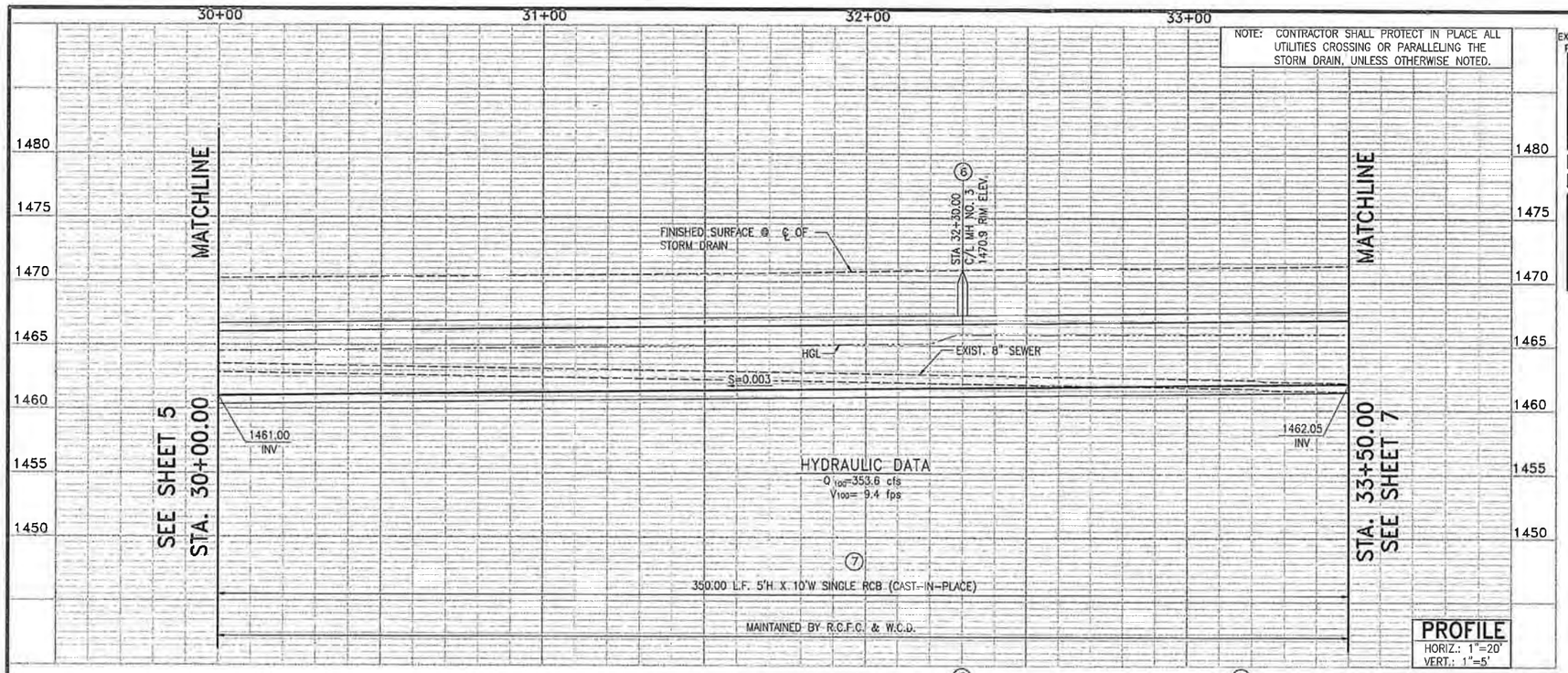
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED BY: [signature] DATE: 1/2/08
APPROVED BY: [signature] DATE: 1-10-2008

CITY OF MORENO VALLEY APPROVALS
PREM KUMAR, ASSISTANT CITY ENGINEER R.C.E. C60483 (EXP. 12/31/08) — 12/11/07 DATE
CHRIS A. VOGT, CITY ENGINEER R.C.E. C44250 (EXP. 6/30/09) — 12/10/07 DATE

PERRIS VALLEY MASTER DRAINAGE PLAN
LATERAL B-3 STAGE-2
STA. 26+50.00 – STA. 30+00.00

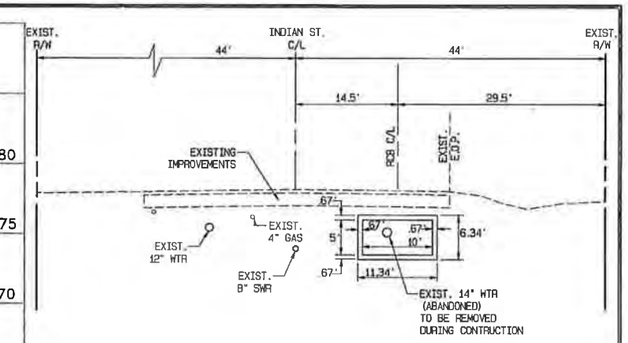
PROJECT NO. 4-0-00526
DRAWING NO. 4-948
SHEET NO. 5 OF 28

G:\2008\06-0146\DWG&PRO\06-0146-LAT-B-3.pro 11/9/2007



PROFILE

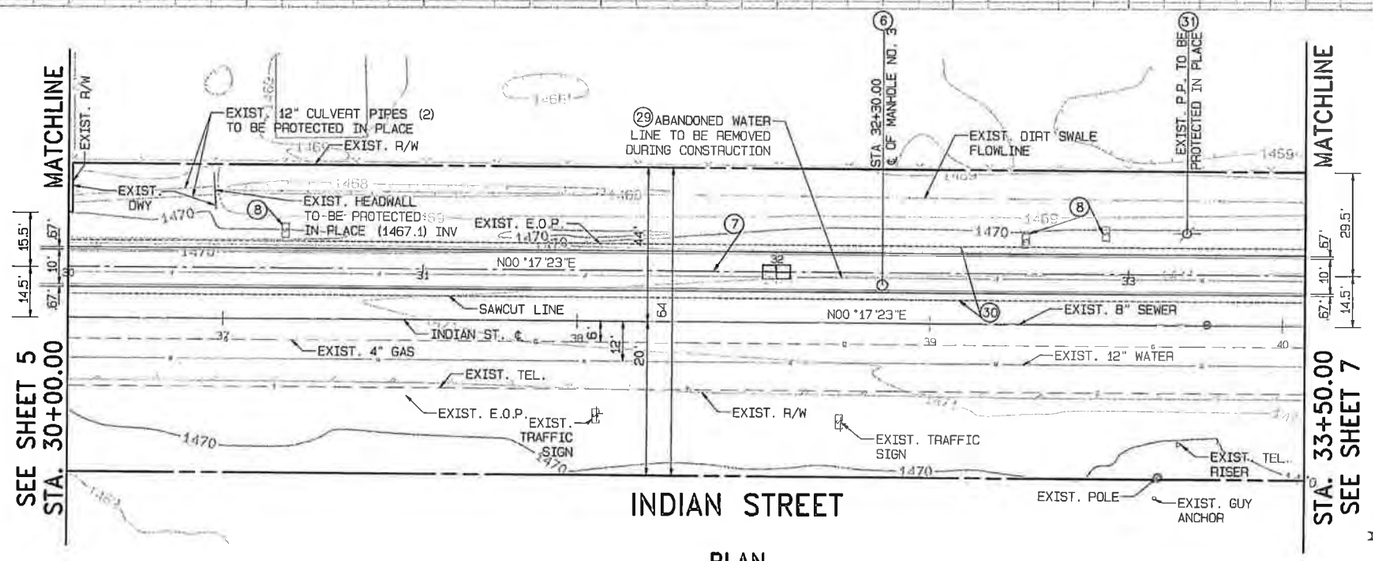
HORIZ.: 1"=20'
VERT.: 1"=5'



SECTION AT STA. 32+00.00

TYPICAL FROM STA. 30+60.00 TO STA. 33+50.00

10' 0 10'



PLAN

20' 0 20'

CONSTRUCTION NOTES

6. CONSTRUCT MANHOLE NO. 3 PER RCFC&WCD STD. DWG. MH253
7. CONSTRUCT 5'H x 10'W SINGLE CELL RCB (CAST-IN-PLACE) PER CALTRANS STD. NO. D80
8. REMOVE AND REPLACE EXISTING SIGN
29. ABANDONED WATER LINE TO BE REMOVED DURING CONSTRUCTION
30. TRENCH BACKFILL AND ROADWAY REPAIR PER CITY OF MORENO VALLEY STD. NO. 602 AND DETAIL OF SHEET 27
31. EXISTING POWER POLE TO BE PROTECTED IN PLACE

AS BUILT
APPROVED BY: Jon C Cole
DATE 11 Feb 09

Don't Dig...Until You Call U.S.A. Toll Free 1-800-227-2600 for the location of buried utility lines. Don't disrupt vital services.
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK: ELEVATION = 1464.22
COUNTY OF RIVERSIDE B.M. M-30. AT THE INTERSECTION OF PERRIS BOULEVARD AND OLEANDER (BRIDGE #5309): 24.0 FEET WEST OF PERRIS BOULEVARD: 5.5 FEET SOUTH OF THE NORTHERLY END OF A 12 INCH x 48 FOOT CONCRETE HEADWALL: A BRASS DISK SET IN THE TOP OF A CONCRETE HEADWALL AND MARKED M-30 1963.

REF.	DESCRIPTION	APPR.	DATE
	REVISIONS		

ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET, RIVERSIDE, CA. 92506
PH. (951) 686-1070 FAX (951) 788-1256
PREPARED BY: John C Cole DATE: 13 Nov 07
R.C.E. NO. C67239 EXP. DATE 9-30-08
DESIGNED BY: JC
DRAWN BY: RR
CHECKED BY: JC

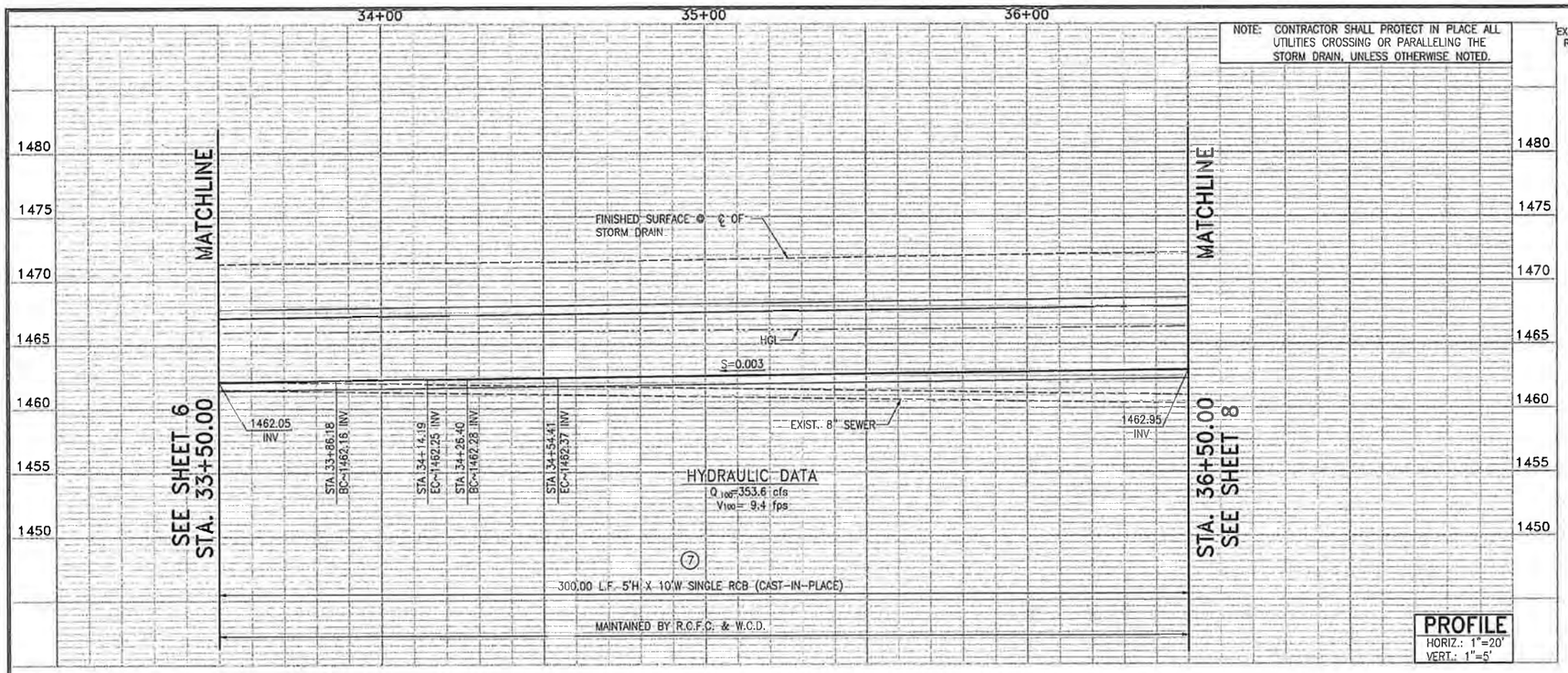
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED BY: DATE: 1/9/08
APPROVED BY: Stuart E. McKibben DATE: 1-10-2008

CITY OF MORENO VALLEY APPROVALS
PREM KUMAR, ASSISTANT CITY ENGINEER R.C.E. 052463 (EXP. 12/31/08) DATE 12/10/07
CHRIS A. VOGT, CITY ENGINEER R.C.E. 44250 (EXP. 6/30/09) DATE 12/12/07

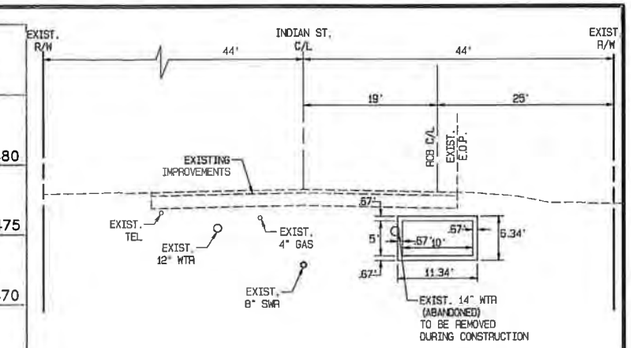
PERRIS VALLEY MASTER DRAINAGE PLAN
LATERAL B-3 STAGE-2
STA. 30+00.00 – STA. 33+50.00

PROJECT NO. 4-0-00526
DRAWING NO. 4-948
SHEET NO. 6 OF 28

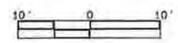
G:\2006\06-0146\DWG&PRO\06-0146-LAT-B-3.pro 11/8/2007

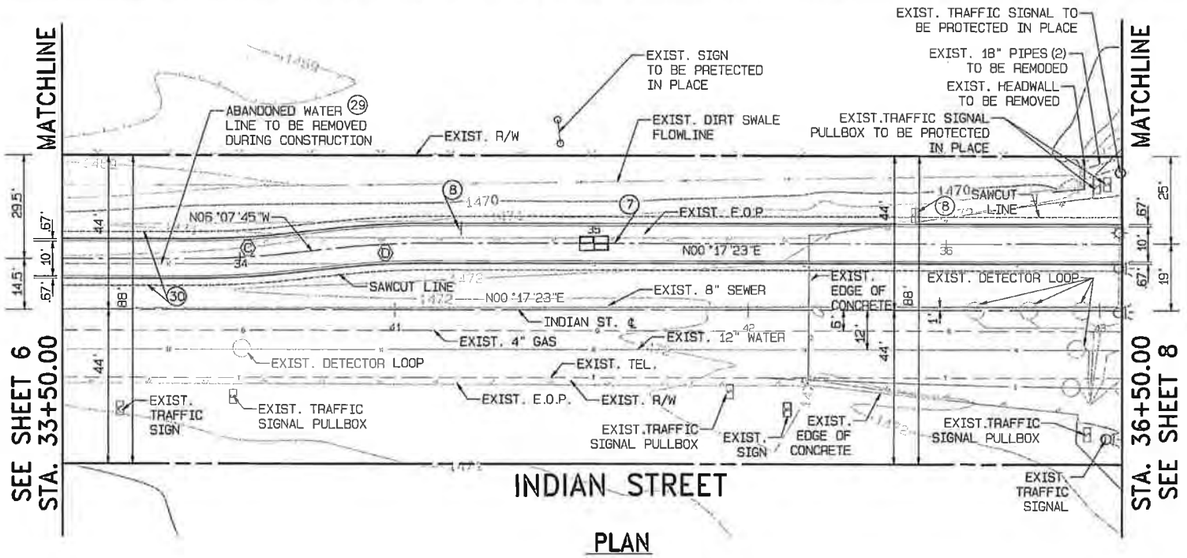


PROFILE
HORIZ.: 1"=20'
VERT.: 1"=5'



SECTION AT STA. 35+00.00
TYPICAL FROM STA. 34+54.41 TO STA. 36+50.00





PLAN

CONSTRUCTION NOTES

(7) CONSTRUCT 5'H x 10'W SINGLE CELL RCB (CAST-IN-PLACE) PER CALTRANS STD. NO. D80

(8) REMOVE AND REPLACE EXISTING SIGN

(29) ABANDONED WATER LINE TO BE REMOVED DURING CONSTRUCTION

(30) TRENCH BACKFILL AND ROADWAY REPAIR PER CITY OF MORENO VALLEY STD. NO. 602 AND DETAIL OF SHEET 27

(C) ℄ CURVE DATA

△=06°25'08"
R=250.00'
L=28.01'
T=14.02'
BC=STA 33+86.18
EC=STA 34+14.19

(D) ℄ CURVE DATA

△=06°25'08"
R=250.00'
L=28.01'
T=14.02'
BC=STA 34+26.40
EC=STA 34+54.41

AS BUILT
APPROVED BY: Jim C Cole
DATE 11 Feb 09

Don't Dig...Until You Call U.S.A. Toll Free
1-800-227-2600
for the location of buried utility lines.
Don't disrupt vital services.
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK: ELEVATION = 1464.22
COUNTY OF RIVERSIDE B.M. M-30. AT THE INTERSECTION OF PERRIS BOULEVARD AND OLEANDER (BRIDGE #5309): 24.0 FEET WEST OF PERRIS BOULEVARD: 5.5 FEET SOUTH OF THE NORTHERLY END OF A 12 INCH x 48 FOOT CONCRETE HEADWALL: A BRASS DISK SET IN THE TOP OF A CONCRETE HEADWALL AND MARKED M-30 1963.

REF.	REVISIONS / DESCRIPTION	APPR.	DATE

ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET, RIVERSIDE, CA. 92506
PH. (951) 686-1070 FAX (951) 788-1256
PREPARED BY: Jim C Cole DATE: 8/10/07
R.C.E. NO. C67239 EXP. DATE 9-30-08
DESIGNED BY: JC
DRAWN BY: RR
CHECKED BY: JC

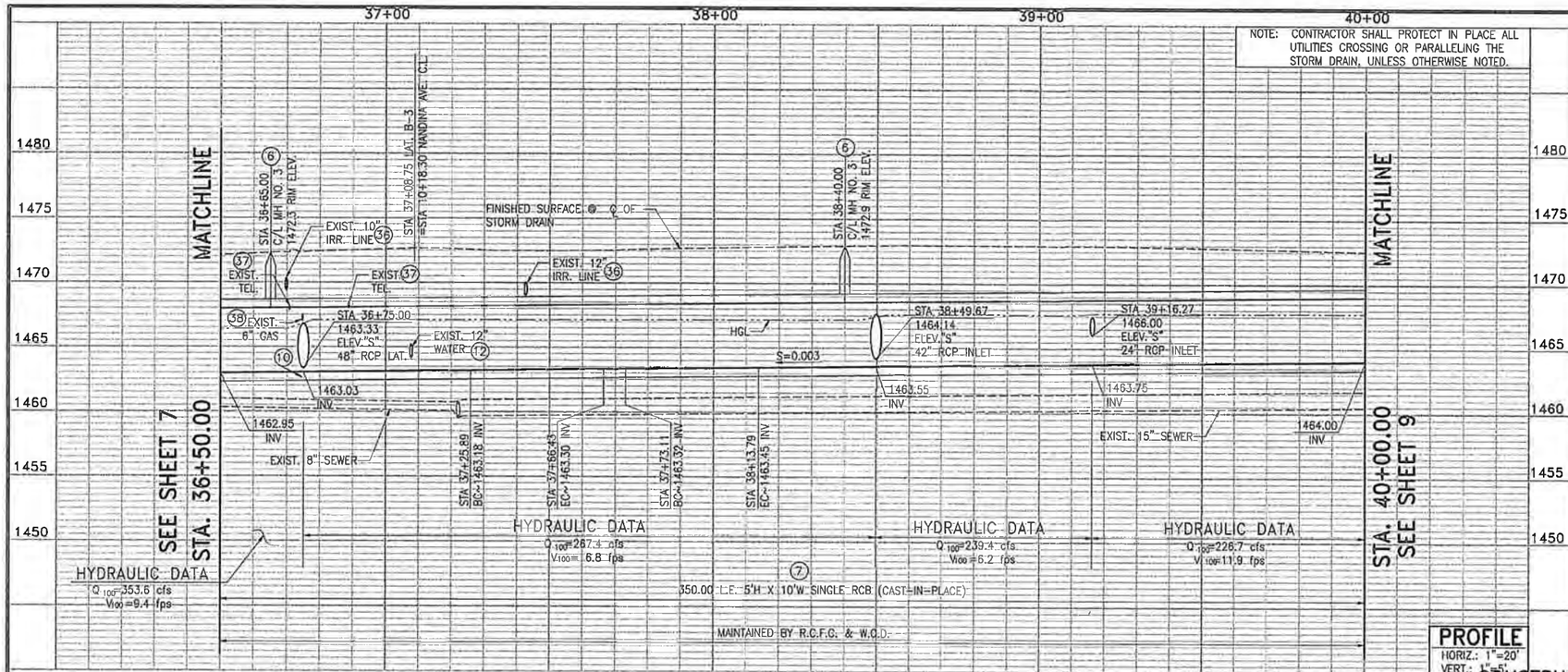
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED BY: [signature] DATE: 1/9/08
APPROVED BY: [signature] DATE: 1-10-2008

CITY OF MORENO VALLEY APPROVALS
PREM KUMAR, ASSISTANT CITY ENGINEER R.C.E. 052463 (EXP. 12/31/08) — DATE 12/6/07
CHRIS A. VOGT, CITY ENGINEER R.C.E. 44250 (EXP. 6/30/09) — DATE 12/12/07

PERRIS VALLEY
MASTER DRAINAGE PLAN
LATERAL B-3 STAGE-2
STA. 33+50.00 - STA. 36+50.00

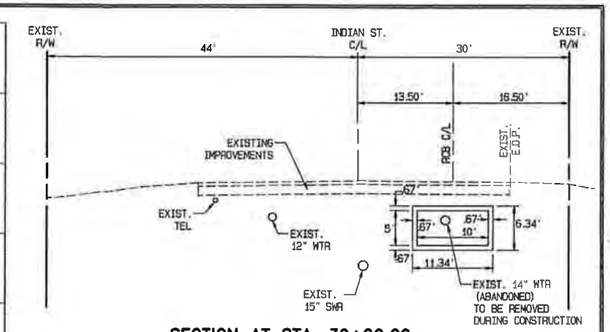
PROJECT NO. 4-0-00526
DRAWING NO. 4-948
SHEET NO. 7 OF 28

C:\2006\06-0146\DWG&PRO\06-0146-LAT-B-3.pro 11/8/2007



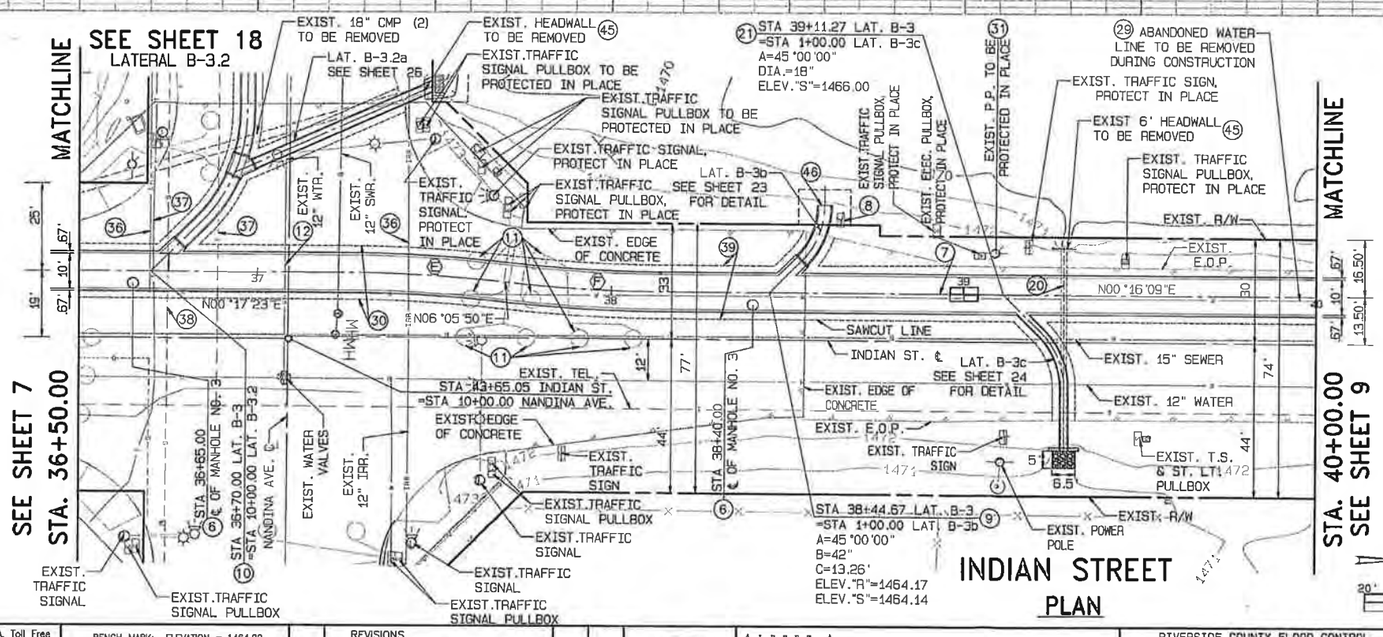
PROFILE

HORIZ.: 1"=20'
VERT.: 1"=5'



SECTION AT STA. 39+00.00

TYPICAL FROM STA. 38+76.46 TO STA. 40+00.00



CONSTRUCTION NOTES

(6) CONSTRUCT MANHOLE NO. 3 PER RCFC&WCD STD. DWG. MH253
(7) CONSTRUCT 5'H x 10'W SINGLE CELL RCB (CAST-IN-PLACE) PER CALTRANS STD. NO. D80
(8) REMOVE AND REPLACE EXISTING SIGN
(9) CONSTRUCT JUNCTION STRUCTURE NO.1 PER RCFC&WCD STD. DWG. JS226
(10) CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFC&WCD STD. NO. JS226 (MODIFIED WITH 3 NO. 6 "E" BARS)
(11) REMOVE AND REPLACE EXISTING DETECTOR LOOPS AND CONDUITS IN KIND WITHIN 72 HOURS OF PAVEMENT REPLACEMENT
(12) EXISTING WATER LINE TO BE RELOCATED PER SK DWG. NO. 1139
(20) REMOVE EXISTING 18" CMP
(21) CONSTRUCT JUNCTION STRUCTURE NO. 3 PER RCFC&WCD STD. DWG. JS228
(29) ABANDONED WATER LINE TO BE REMOVED DURING CONSTRUCTION
(30) TRENCH BACKFILL AND ROADWAY REPAIR PER CITY OF MORENO VALLEY STD. NO. 602 AND DETAIL OF SHEET 27
(31) EXISTING POWER POLE TO BE PROTECTED IN PLACE
(36) EXISTING IRRIGATION LINES TO BE REMOVED AS NECESSARY
(37) EXISTING TEL. LINE TO BE RELOCATED BY OTHERS
(38) EXISTING GAS LINE TO BE RELOCATED BY OTHERS
(39) REMOVE AND REPLACE EXIST. P.C.C. AS NECESSARY, MATCH EXIST. CONC. THICKNESS
(45) REMOVE EXISTING HEADWALL
(46) INSTALL CONCRETE BULKHEAD PER RCFC&WCD STD. DWG. M816

(E) ℄ CURVE DATA
Δ=05°48'27"
R=400.00'
L=40.54'
T=20.29'
BC=STA 37+25.89
EC=STA 37+66.43

(F) ℄ CURVE DATA
Δ=05°49'41"
R=400.00'
L=40.69'
T=20.36'
BC=STA 37+73.11
EC=STA 38+13.79

AS BUILT
APPROVED BY: [signature]
DATE 11 Feb 09
LSW

Don't Dig...Until You Call U.S.A. Toll Free 1-800-227-2600 for the location of buried utility lines. Don't disrupt vital services.
TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK: ELEVATION = 1464.22
COUNTY OF RIVERSIDE B.M. M-30. AT THE INTERSECTION OF PERRIS BOULEVARD AND OLEANDER (BRIDGE #5309): 24.0 FEET WEST OF PERRIS BOULEVARD; 5.5 FEET SOUTH OF THE NORTHERLY END OF A 12 INCH x 48 FOOT CONCRETE HEADWALL: A BRASS DISK SET IN THE TOP OF A CONCRETE HEADWALL AND MARKED M-30 1963.

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET, RIVERSIDE, CA. 92506
PH. (951) 686-1070 FAX (951) 788-1256
PREPARED BY: [signature] DATE: 13 NOV 07
R.C.E. NO. C67239 EXP. DATE 9-30-08
DESIGNED BY: JC
DRAWN BY: RR
CHECKED BY: JC

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED BY: [signature] DATE: 1/8/08
APPROVED BY: [signature] DATE: 1-10-2008

CITY OF MORENO VALLEY APPROVALS
PREM KUMAR, ASSISTANT CITY ENGINEER R.C.E. C52463 (EXP. 12/31/08) DATE 12/4/07
CHRIS A. VOGT, CITY ENGINEER R.C.E. C44250 (EXP. 6/30/09) DATE 12/12/07

PERRIS VALLEY MASTER DRAINAGE PLAN
LATERAL B-3 STAGE-2
STA. 36+50.00 – STA. 40+00.00

PROJECT NO. 4-0-00526
DRAWING NO. 4-948
SHEET NO. 8 OF 28

G:\2006\06-0146\DWG&PRO\06-0146-LAT-B-3.pro 11/9/2007

APPENDIX B

EXISTING CONDITION HYDROLOGY CALCULATIONS

```
****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-99 Advanced Engineering Software (aes)
            Ver. 1.5A Release Date: 01/01/99  License ID 1435

                         Analysis prepared by:

                          THIENES ENGINEERING
                        16800 VALLEY VIEW AVENUE
                           LA MIRADA CA 90638
                  PH: (714) 521-4811 FAX: (714) 521-4173

 ************************** DESCRIPTION OF STUDY **************************
* FIRST INDUSTRIAL - INDIAN & NANDINA, MORENO VALLEY                      *
* EXISTING CONDITION, 10-YEAR                                             *
*                                                                         *
 ***************************************************************************

  FILE NAME: C:\XDRIVE\3190\EX10.DAT
  TIME/DATE OF STUDY: 14:05 09/27/2013
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.460
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.772
  SLOPE OF INTENSITY DURATION CURVE = 0.5000
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =   740.00
  UPSTREAM ELEVATION =   1476.50
  DOWNSTREAM ELEVATION =   1474.50
  ELEVATION DIFFERENCE =      2.00
  TC = 0.533*[(  740.00**3)/(     2.00)]**.2 =   24.419
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.210
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6020
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.70
  TOTAL AREA(ACRES) =      3.70   TOTAL RUNOFF(CFS) =      2.70

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1474.50  DOWNSTREAM(FEET) =   1472.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.0025
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.70
  FLOW VELOCITY(FEET/SEC) =   0.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =  13.36   Tc(MIN.) =  37.78
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =  1470.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.973
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5571
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    6.95   SUBAREA RUNOFF(CFS) =    3.77
  TOTAL AREA(ACRES) =    10.65   TOTAL RUNOFF(CFS) =    6.46
  TC(MIN) =  37.78

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    122.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1472.70  DOWNSTREAM(FEET) =   1471.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   545.00   CHANNEL SLOPE =  0.0029
  CHANNEL FLOW THRU SUBAREA(CFS) =      6.46
  FLOW VELOCITY(FEET/SEC) =   1.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.47   Tc(MIN.) =  45.25
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    122.00 =  2015.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    122.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.889
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5377
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    3.90   SUBAREA RUNOFF(CFS) =    1.86
  TOTAL AREA(ACRES) =    14.55   TOTAL RUNOFF(CFS) =    8.33
  TC(MIN) =  45.25

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  45.25
  RAINFALL INTENSITY(INCH/HR) =   0.89
  TOTAL STREAM AREA(ACRES) =   14.55
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.33

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =   980.00
  UPSTREAM ELEVATION =   1476.40
  DOWNSTREAM ELEVATION =   1473.00
  ELEVATION DIFFERENCE =      3.40
  TC = 0.533*[(  980.00**3)/(     3.40)]**.2 =   25.992
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.173
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5958
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      5.49
  TOTAL AREA(ACRES) =      7.85   TOTAL RUNOFF(CFS) =      5.49

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    122.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1473.00  DOWNSTREAM(FEET) =   1471.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   680.00   CHANNEL SLOPE =  0.0028
  CHANNEL FLOW THRU SUBAREA(CFS) =      5.49
```

```
  FLOW VELOCITY(FEET/SEC) =   1.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.94   Tc(MIN.) =  35.93
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    122.00 =  1660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    122.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.998
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5623
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    4.00   SUBAREA RUNOFF(CFS) =    2.24
  TOTAL AREA(ACRES) =    11.85   TOTAL RUNOFF(CFS) =    7.73
  TC(MIN) =  35.93

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  35.93
  RAINFALL INTENSITY(INCH/HR) =   1.00
  TOTAL STREAM AREA(ACRES) =   11.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.73

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1476.00
  DOWNSTREAM ELEVATION =   1473.00
  ELEVATION DIFFERENCE =      3.00
  TC = 0.533*[( 1000.00**3)/(     3.00)]**.2 =   26.976
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.151
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4713
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      4.29
  TOTAL AREA(ACRES) =      7.90   TOTAL RUNOFF(CFS) =      4.29

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1473.00  DOWNSTREAM(FEET) =   1471.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.0032
  CHANNEL FLOW THRU SUBAREA(CFS) =      4.29
  FLOW VELOCITY(FEET/SEC) =   1.16 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.51   Tc(MIN.) =  35.49
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    122.00 =  1590.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.004
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4404
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.10   SUBAREA RUNOFF(CFS) =    0.93
  TOTAL AREA(ACRES) =    10.00   TOTAL RUNOFF(CFS) =    5.22
  TC(MIN) =  35.49

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
```

```
TIME OF CONCENTRATION(MIN.) =  35.49
RAINFALL INTENSITY(INCH/HR) =   1.00
TOTAL STREAM AREA(ACRES) =   10.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.22

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        8.33    45.25       0.889         14.55
    2        7.73    35.93       0.998         11.85
    3        5.22    35.49       1.004         10.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  3 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       19.38    35.49       1.004
    2       19.53    35.93       0.998
    3       19.83    45.25       0.889

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     19.83   Tc(MIN.) =   45.25
TOTAL AREA(ACRES) =     36.40
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    122.00 =  2015.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1471.10  DOWNSTREAM(FEET) =   1468.90
CHANNEL LENGTH THRU SUBAREA(FEET) =   665.00   CHANNEL SLOPE =  0.0033
CHANNEL FLOW THRU SUBAREA(CFS) =     19.83
FLOW VELOCITY(FEET/SEC) =   1.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   6.45   Tc(MIN.) =  51.70
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    123.00 =  2680.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.832
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8498
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) =    6.80   SUBAREA RUNOFF(CFS) =    4.81
TOTAL AREA(ACRES) =    43.20   TOTAL RUNOFF(CFS) =   24.64
TC(MIN) =  51.70
** PEAK FLOW RATE TABLE **
STREAM    RUNOFF       Tc
NUMBER     (CFS)     (MIN.)
    1       24.73      41.98
    2       24.85      42.41
    3       24.64      51.70
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) =    24.85  Tc(MIN.) =  42.41

****************************************************************************
FLOW PROCESS FROM NODE    123.00 TO NODE    134.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1468.90  DOWNSTREAM(FEET) =   1467.20
CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00   CHANNEL SLOPE =  0.0027
CHANNEL FLOW THRU SUBAREA(CFS) =     24.85
FLOW VELOCITY(FEET/SEC) =   1.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   6.36   Tc(MIN.) =  48.77
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =  3310.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    123.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.856
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8630
```

```
SOIL CLASSIFICATION IS "C"
SUBAREA AREA(ACRES) =     2.40   SUBAREA RUNOFF(CFS) =     1.77
TOTAL AREA(ACRES) =     45.60   TOTAL RUNOFF(CFS) =    26.62
TC(MIN) =  48.77

****************************************************************************
FLOW PROCESS FROM NODE     134.00 TO NODE     134.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  48.77
RAINFALL INTENSITY(INCH/HR) =   0.86
TOTAL STREAM AREA(ACRES) =   45.60
PEAK FLOW RATE(CFS) AT CONFLUENCE =      26.62

****************************************************************************
FLOW PROCESS FROM NODE     130.00 TO NODE     131.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
INITIAL SUBAREA FLOW-LENGTH =  1000.00
UPSTREAM ELEVATION =   1475.00
DOWNSTREAM ELEVATION =   1470.50
ELEVATION DIFFERENCE =       4.50
TC = 0.533*[( 1000.00**3)/(     4.50)]**.2 =   24.875
10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.199
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4803
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF(CFS) =       4.52
TOTAL AREA(ACRES) =       7.85   TOTAL RUNOFF(CFS) =       4.52

****************************************************************************
FLOW PROCESS FROM NODE     131.00 TO NODE     132.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1470.50  DOWNSTREAM(FEET) =   1469.50
CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.0029
CHANNEL FLOW THRU SUBAREA(CFS) =       4.52
FLOW VELOCITY(FEET/SEC) =   1.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   5.30   Tc(MIN.) =  30.17
LONGEST FLOWPATH FROM NODE     130.00 TO NODE     132.00 =  1350.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     131.00 TO NODE     132.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.089
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8681
SOIL CLASSIFICATION IS "C"
SUBAREA AREA(ACRES) =     5.15   SUBAREA RUNOFF(CFS) =     4.87
TOTAL AREA(ACRES) =    13.00   TOTAL RUNOFF(CFS) =     9.39
TC(MIN) =  30.17

****************************************************************************
FLOW PROCESS FROM NODE     132.00 TO NODE     133.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1469.50  DOWNSTREAM(FEET) =   1468.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   360.00   CHANNEL SLOPE =  0.0042
CHANNEL FLOW THRU SUBAREA(CFS) =       9.39
FLOW VELOCITY(FEET/SEC) =   1.59 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.78   Tc(MIN.) =  33.95
LONGEST FLOWPATH FROM NODE     130.00 TO NODE     133.00 =  1710.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     132.00 TO NODE     133.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.026
```

```
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5683
SOIL CLASSIFICATION IS "C"
SUBAREA AREA(ACRES) =     8.05   SUBAREA RUNOFF(CFS) =     4.70
TOTAL AREA(ACRES) =     21.05   TOTAL RUNOFF(CFS) =    14.08
TC(MIN) =  33.95

****************************************************************************
FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1468.00  DOWNSTREAM(FEET) =   1467.20
CHANNEL LENGTH THRU SUBAREA(FEET) =   310.00   CHANNEL SLOPE =  0.0026
CHANNEL FLOW THRU SUBAREA(CFS) =     14.08
FLOW VELOCITY(FEET/SEC) =   1.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.73   Tc(MIN.) =  37.68
LONGEST FLOWPATH FROM NODE    130.00 TO NODE    134.00 =  2020.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.974
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4337
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) =     7.85   SUBAREA RUNOFF(CFS) =     3.32
TOTAL AREA(ACRES) =     28.90   TOTAL RUNOFF(CFS) =    17.40
TC(MIN) =  37.68

****************************************************************************
FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  37.68
RAINFALL INTENSITY(INCH/HR) =   0.97
TOTAL STREAM AREA(ACRES) =   28.90
PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.40

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       26.51    48.34       0.860         45.60
    1       26.62    48.77       0.856         45.60
    1       26.26    58.07       0.785         45.60
    2       17.40    37.68       0.974         28.90

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       38.06    37.68       0.974
    2       41.87    48.34       0.860
    3       41.92    48.77       0.856
    4       40.28    58.07       0.785

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     41.92   Tc(MIN.) =   48.77
TOTAL AREA(ACRES) =     74.50
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =  3310.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =     74.50  TC(MIN.) =     48.77
PEAK FLOW RATE(CFS)    =     41.92
*** PEAK FLOW RATE TABLE ***
        Q(CFS)   Tc(MIN.)
1        38.06     37.68
2        41.87     48.34
3        41.92     48.77
4        40.28     58.07
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                  (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-99 Advanced Engineering Software (aes)
            Ver. 1.5A Release Date: 01/01/99  License ID 1435

                        Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* FIRST INDUSTRIAL - INDIAN & NANDINA, MORENO VALLEY                      *
* EXISTING CONDITION, 100-YEAR                                            *
*                                                                         *
 ***************************************************************************

  FILE NAME: C:\XDRIVE\3190\EX100.DAT
  TIME/DATE OF STUDY: 11:39 09/27/2013
---------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
---------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.460
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  SLOPE OF INTENSITY DURATION CURVE = 0.5000
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
===========================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =   740.00
  UPSTREAM ELEVATION =   1476.50
  DOWNSTREAM ELEVATION =   1474.50
  ELEVATION DIFFERENCE =      2.00
  TC = 0.533*[(  740.00**3)/(     2.00)]**.2 =   24.419
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.881
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6826
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      4.75
  TOTAL AREA(ACRES) =      3.70   TOTAL RUNOFF(CFS) =      4.75

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  52
---------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1474.50  DOWNSTREAM(FEET) =   1472.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.0025
  CHANNEL FLOW THRU SUBAREA(CFS) =      4.75
  FLOW VELOCITY(FEET/SEC) =   1.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =  11.75   Tc(MIN.) =  36.17
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =  1470.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.545
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6486
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    6.95   SUBAREA RUNOFF(CFS) =    6.97
  TOTAL AREA(ACRES) =    10.65   TOTAL RUNOFF(CFS) =   11.72
  TC(MIN) =  36.17

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    122.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1472.70  DOWNSTREAM(FEET) =   1471.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   545.00   CHANNEL SLOPE =  0.0029
  CHANNEL FLOW THRU SUBAREA(CFS) =     11.72
  FLOW VELOCITY(FEET/SEC) =   1.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.44   Tc(MIN.) =  42.61
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    122.00 =  2015.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    122.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.424
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6335
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    3.90   SUBAREA RUNOFF(CFS) =    3.52
  TOTAL AREA(ACRES) =    14.55   TOTAL RUNOFF(CFS) =   15.24
  TC(MIN) =  42.61

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  42.61
  RAINFALL INTENSITY(INCH/HR) =   1.42
  TOTAL STREAM AREA(ACRES) =   14.55
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.24

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =   980.00
  UPSTREAM ELEVATION =   1476.40
  DOWNSTREAM ELEVATION =   1473.00
  ELEVATION DIFFERENCE =      3.40
  TC = 0.533*[(  980.00**3)/(     3.40)]**.2 =   25.992
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.823
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6774
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      9.70
  TOTAL AREA(ACRES) =      7.85   TOTAL RUNOFF(CFS) =      9.70

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    122.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1473.00  DOWNSTREAM(FEET) =   1471.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   680.00   CHANNEL SLOPE =  0.0028
  CHANNEL FLOW THRU SUBAREA(CFS) =      9.70
```

```
  FLOW VELOCITY(FEET/SEC) =   1.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.65   Tc(MIN.) =  34.64
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    122.00 =  1660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    122.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.579
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6525
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    4.00   SUBAREA RUNOFF(CFS) =    4.12
  TOTAL AREA(ACRES) =    11.85   TOTAL RUNOFF(CFS) =   13.82
  TC(MIN) =  34.64

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  34.64
  RAINFALL INTENSITY(INCH/HR) =   1.58
  TOTAL STREAM AREA(ACRES) =   11.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.82

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1476.00
  DOWNSTREAM ELEVATION =   1473.00
  ELEVATION DIFFERENCE =      3.00
  TC = 0.533*[( 1000.00**3)/(     3.00)]**.2 =   26.976
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.790
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5677
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      8.03
  TOTAL AREA(ACRES) =      7.90   TOTAL RUNOFF(CFS) =      8.03

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1473.00  DOWNSTREAM(FEET) =   1471.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.0032
  CHANNEL FLOW THRU SUBAREA(CFS) =      8.03
  FLOW VELOCITY(FEET/SEC) =   1.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.33   Tc(MIN.) =  34.30
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    122.00 =  1590.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.587
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5421
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.10   SUBAREA RUNOFF(CFS) =    1.81
  TOTAL AREA(ACRES) =    10.00   TOTAL RUNOFF(CFS) =    9.83
  TC(MIN) =  34.30

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
```

```
TIME OF CONCENTRATION(MIN.) =  34.30
RAINFALL INTENSITY(INCH/HR) =   1.59
TOTAL STREAM AREA(ACRES) =   10.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.83

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       15.24    42.61       1.424         14.55
    2       13.82    34.64       1.579         11.85
    3        9.83    34.30       1.587         10.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  3 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       35.78    34.30       1.587
    2       35.99    34.64       1.579
    3       36.51    42.61       1.424

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     36.51   Tc(MIN.) =   42.61
TOTAL AREA(ACRES) =     36.40
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    122.00 =  2015.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1471.10  DOWNSTREAM(FEET) =   1468.90
CHANNEL LENGTH THRU SUBAREA(FEET) =   665.00   CHANNEL SLOPE =  0.0033
CHANNEL FLOW THRU SUBAREA(CFS) =     36.51
FLOW VELOCITY(FEET/SEC) =   2.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   5.45   Tc(MIN.) =  48.06
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    123.00 =  2680.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.341
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8605
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) =    6.80   SUBAREA RUNOFF(CFS) =    7.85
TOTAL AREA(ACRES) =    43.20   TOTAL RUNOFF(CFS) =   44.36
TC(MIN) =  48.06
** PEAK FLOW RATE TABLE **
STREAM   RUNOFF       Tc
NUMBER    (CFS)     (MIN.)
   1       44.42      39.78
   2       44.59      40.11
   3       44.36      48.06
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) =    44.59  Tc(MIN.) =  40.11

****************************************************************************
FLOW PROCESS FROM NODE    123.00 TO NODE    134.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1468.90  DOWNSTREAM(FEET) =   1467.20
CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00   CHANNEL SLOPE =  0.0027
CHANNEL FLOW THRU SUBAREA(CFS) =     44.59
FLOW VELOCITY(FEET/SEC) =   1.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   5.40   Tc(MIN.) =  45.50
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =  3310.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    123.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.378
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8727
```

```
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =     2.40   SUBAREA RUNOFF(CFS) =     2.89
  TOTAL AREA(ACRES) =     45.60   TOTAL RUNOFF(CFS) =    47.48
  TC(MIN) =  45.50

****************************************************************************
  FLOW PROCESS FROM NODE     134.00 TO NODE     134.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  45.50
  RAINFALL INTENSITY(INCH/HR) =   1.38
  TOTAL STREAM AREA(ACRES) =   45.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      47.48

****************************************************************************
  FLOW PROCESS FROM NODE     130.00 TO NODE     131.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS: UNDEVELOPED WITH POOR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1475.00
  DOWNSTREAM ELEVATION =   1470.50
  ELEVATION DIFFERENCE =      4.50
  TC = 0.533*[( 1000.00**3)/(     4.50)]**.2 =   24.875
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.864
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5761
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      8.43
  TOTAL AREA(ACRES) =      7.85   TOTAL RUNOFF(CFS) =      8.43

****************************************************************************
  FLOW PROCESS FROM NODE     131.00 TO NODE     132.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1470.50  DOWNSTREAM(FEET) =   1469.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.0029
  CHANNEL FLOW THRU SUBAREA(CFS) =      8.43
  FLOW VELOCITY(FEET/SEC) =   1.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.56   Tc(MIN.) =  29.43
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    132.00 =  1350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     131.00 TO NODE     132.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.713
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8767
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =     5.15   SUBAREA RUNOFF(CFS) =     7.74
  TOTAL AREA(ACRES) =     13.00   TOTAL RUNOFF(CFS) =    16.16
  TC(MIN) =  29.43

****************************************************************************
  FLOW PROCESS FROM NODE     132.00 TO NODE     133.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1469.50  DOWNSTREAM(FEET) =   1468.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   360.00   CHANNEL SLOPE =  0.0042
  CHANNEL FLOW THRU SUBAREA(CFS) =     16.16
  FLOW VELOCITY(FEET/SEC) =   1.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.28   Tc(MIN.) =  32.72
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    133.00 =  1710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     132.00 TO NODE     133.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.625
```

```
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6576
SOIL CLASSIFICATION IS "C"
SUBAREA AREA(ACRES) =     8.05   SUBAREA RUNOFF(CFS) =     8.60
TOTAL AREA(ACRES) =     21.05   TOTAL RUNOFF(CFS) =    24.77
TC(MIN) =  32.72

****************************************************************************
FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1468.00  DOWNSTREAM(FEET) =   1467.20
CHANNEL LENGTH THRU SUBAREA(FEET) =   310.00   CHANNEL SLOPE =  0.0026
CHANNEL FLOW THRU SUBAREA(CFS) =     24.77
FLOW VELOCITY(FEET/SEC) =   1.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.20   Tc(MIN.) =  35.92
LONGEST FLOWPATH FROM NODE    130.00 TO NODE    134.00 =  2020.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.551
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5372
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) =     7.85   SUBAREA RUNOFF(CFS) =     6.54
TOTAL AREA(ACRES) =     28.90   TOTAL RUNOFF(CFS) =    31.31
TC(MIN) =  35.92

****************************************************************************
FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  35.92
RAINFALL INTENSITY(INCH/HR) =   1.55
TOTAL STREAM AREA(ACRES) =   28.90
PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.31

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
   1        47.32    45.18       1.383         45.60
   1        47.48    45.50       1.378         45.60
   1        47.02    53.47       1.271         45.60
   2        31.31    35.92       1.551         28.90

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
   1        68.93    35.92       1.551
   2        75.24    45.18       1.383
   3        75.30    45.50       1.378
   4        72.68    53.47       1.271

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     75.30   Tc(MIN.) =   45.50
TOTAL AREA(ACRES) =     74.50
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    134.00 =  3310.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =     74.50  TC(MIN.) =     45.50
PEAK FLOW RATE(CFS)    =     75.30
*** PEAK FLOW RATE TABLE ***
        Q(CFS)   Tc(MIN.)
1        68.93     35.92
2        75.24     45.18
3        75.30     45.50
4        72.68     53.47
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

APPENDIX C

PROPOSED CONDITION HYDROLOGY CALCULATIONS

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-99 Advanced Engineering Software (aes)
             Ver. 1.5A Release Date: 01/01/99  License ID 1435

                          Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* FIRST INDUSTRIAL - INDIAN & NANDINA, MORENO VALLEY                       *
* PROPOSED CONDITION, 10-YEAR                                              *
* NODES 100-123                                                            *
 ****************************************************************************

  FILE NAME: C:\XDRIVE\3190\PR10A.DAT
  TIME/DATE OF STUDY: 13:54 09/30/2013
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.460
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.772
  SLOPE OF INTENSITY DURATION CURVE = 0.5000
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  =====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =   620.00
  UPSTREAM ELEVATION =   1474.01
  DOWNSTREAM ELEVATION =   1468.58
  ELEVATION DIFFERENCE =      5.43
  TC = 0.303*[(  620.00**3)/(     5.43)]**.2 =   10.234
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.869
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8782
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      5.75
  TOTAL AREA(ACRES) =      3.50   TOTAL RUNOFF(CFS) =      5.75

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =   9
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   1468.58
  DOWNSTREAM NODE ELEVATION(FEET) =   1466.67
  CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.170
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
```

```
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
MAXIMUM DEPTH(FEET) =   1.00
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.730
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8661
SOIL CLASSIFICATION IS "B"
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     11.18
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.63
AVERAGE FLOW DEPTH(FEET) =   0.44   FLOOD WIDTH(FEET) =   28.25
"V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.71   Tc(MIN.) =  11.95
SUBAREA AREA(ACRES) =    7.25       SUBAREA RUNOFF(CFS) =   10.86
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
TOTAL AREA(ACRES) =   10.75         PEAK FLOW RATE(CFS) =      16.61

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  0.49   FLOOD WIDTH(FEET) =   33.47
FLOW VELOCITY(FEET/SEC.) =   2.83   DEPTH*VELOCITY(FT*FT/SEC) =   1.40
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =   890.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1463.81  DOWNSTREAM(FEET) =  1462.81
FLOW LENGTH(FEET) =   500.00   MANNING'S N =  0.012
DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.44
ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     16.61
PIPE TRAVEL TIME(MIN.) =   1.88    Tc(MIN.) =  13.83
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =  1390.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.608
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8645
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) =    7.85   SUBAREA RUNOFF(CFS) =   10.91
TOTAL AREA(ACRES) =    18.60   TOTAL RUNOFF(CFS) =   27.52
TC(MIN) =  13.83

****************************************************************************
FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1462.81  DOWNSTREAM(FEET) =  1461.81
FLOW LENGTH(FEET) =   500.00   MANNING'S N =  0.012
DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.02
ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     27.52
PIPE TRAVEL TIME(MIN.) =   1.66    Tc(MIN.) =  15.49
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =  1890.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.520
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8746
SOIL CLASSIFICATION IS "C"
SUBAREA AREA(ACRES) =    9.15   SUBAREA RUNOFF(CFS) =   12.16
TOTAL AREA(ACRES) =    27.75   TOTAL RUNOFF(CFS) =   39.68
TC(MIN) =  15.49

****************************************************************************
FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1461.81  DOWNSTREAM(FEET) =  1461.69
```

```
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.53
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     39.68
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =  15.67
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =  1950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    123.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  15.67
  RAINFALL INTENSITY(INCH/HR) =   1.51
  TOTAL STREAM AREA(ACRES) =   27.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     39.68

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =   500.00
  UPSTREAM ELEVATION =   1474.01
  DOWNSTREAM ELEVATION =   1470.71
  ELEVATION DIFFERENCE =      3.30
  TC = 0.303*[(  500.00**3)/(     3.30)]**.2 =    9.937
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.897
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8680
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      3.62
  TOTAL AREA(ACRES) =      2.20   TOTAL RUNOFF(CFS) =      3.62

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.897
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5798
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.25   SUBAREA RUNOFF(CFS) =    1.38
  TOTAL AREA(ACRES) =     3.45   TOTAL RUNOFF(CFS) =    5.00
  TC(MIN) =   9.94

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =   9
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   1470.71
  DOWNSTREAM NODE ELEVATION(FEET) =   1469.05
  CHANNEL LENGTH THRU SUBAREA(FEET) =   205.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.170
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.782
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8667
  SOIL CLASSIFICATION IS "B"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.58
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.57
  AVERAGE FLOW DEPTH(FEET) =   0.39   FLOOD WIDTH(FEET) =   23.18
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.33   Tc(MIN.) =  11.27
  SUBAREA AREA(ACRES) =    3.35       SUBAREA RUNOFF(CFS) =    5.17
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =    6.80         PEAK FLOW RATE(CFS) =      10.17

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOOD WIDTH(FEET) =   26.35
  FLOW VELOCITY(FEET/SEC.) =   2.72   DEPTH*VELOCITY(FT*FT/SEC) =   1.15
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    112.00 =   705.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1466.32  DOWNSTREAM(FEET) =  1466.06
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.57
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.17
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =  12.06
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =   875.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.722
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8660
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.70   SUBAREA RUNOFF(CFS) =    4.03
  TOTAL AREA(ACRES) =     9.50   TOTAL RUNOFF(CFS) =   14.20
  TC(MIN) =  12.06

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1466.06  DOWNSTREAM(FEET) =  1465.81
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.80
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.20
  PIPE TRAVEL TIME(MIN.) =   0.75    Tc(MIN.) =  12.81
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    114.00 =  1045.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.671
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8653
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.70   SUBAREA RUNOFF(CFS) =    3.90
  TOTAL AREA(ACRES) =    12.20   TOTAL RUNOFF(CFS) =   18.10
  TC(MIN) =  12.81

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1465.81  DOWNSTREAM(FEET) =  1465.53
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.24
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     18.10
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =  13.48
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    115.00 =  1215.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.629
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8648
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    2.68
  TOTAL AREA(ACRES) =    14.10   TOTAL RUNOFF(CFS) =   20.78
  TC(MIN) =  13.48
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1465.53  DOWNSTREAM(FEET) =  1465.30
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.07
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     20.78
  PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =  14.17
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    116.00 =  1385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.589
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8642
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.70   SUBAREA RUNOFF(CFS) =    3.71
  TOTAL AREA(ACRES) =    16.80   TOTAL RUNOFF(CFS) =   24.48
  TC(MIN) =  14.17

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    117.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1465.30  DOWNSTREAM(FEET) =  1465.04
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.40
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     24.48
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =  14.82
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    117.00 =  1555.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.554
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8638
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    2.55
  TOTAL AREA(ACRES) =    18.70   TOTAL RUNOFF(CFS) =   27.03
  TC(MIN) =  14.82

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    118.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1465.04  DOWNSTREAM(FEET) =  1464.79
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  26.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.49
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     27.03
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =  15.45
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    118.00 =  1725.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    118.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.522
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8633
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.75   SUBAREA RUNOFF(CFS) =    3.61
  TOTAL AREA(ACRES) =    21.45   TOTAL RUNOFF(CFS) =   30.65
```

```
TC(MIN) =  15.45

****************************************************************************
  FLOW PROCESS FROM NODE     118.00 TO NODE     119.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1464.79  DOWNSTREAM(FEET) =  1464.53
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.65
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     30.65
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =  16.06
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    119.00 =  1895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     119.00 TO NODE     119.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.493
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8629
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.75   SUBAREA RUNOFF(CFS) =    3.54
  TOTAL AREA(ACRES) =    24.20   TOTAL RUNOFF(CFS) =   34.19
  TC(MIN) =  16.06

****************************************************************************
  FLOW PROCESS FROM NODE     119.00 TO NODE     120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1464.53  DOWNSTREAM(FEET) =  1464.28
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.74
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     34.19
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =  16.65
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    120.00 =  2065.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     120.00 TO NODE     120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.465
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8625
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    2.40
  TOTAL AREA(ACRES) =    26.10   TOTAL RUNOFF(CFS) =   36.59
  TC(MIN) =  16.65

****************************************************************************
  FLOW PROCESS FROM NODE     120.00 TO NODE     121.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1464.28  DOWNSTREAM(FEET) =  1464.02
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.87
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     36.59
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =  17.24
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    121.00 =  2235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     121.00 TO NODE     121.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.441
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8621
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    6.40   SUBAREA RUNOFF(CFS) =    7.95
```

```
TOTAL AREA(ACRES) =     32.50   TOTAL RUNOFF(CFS) =   44.54
TC(MIN) =  17.24

****************************************************************************
FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1464.02  DOWNSTREAM(FEET) =  1461.69
FLOW LENGTH(FEET) =  1555.00   MANNING'S N =  0.012
DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.07
ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     44.54
PIPE TRAVEL TIME(MIN.) =   5.12    Tc(MIN.) =  22.35
LONGEST FLOWPATH FROM NODE    110.00 TO NODE    122.00 =  3790.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  22.35
RAINFALL INTENSITY(INCH/HR) =   1.26
TOTAL STREAM AREA(ACRES) =   32.50
PEAK FLOW RATE(CFS) AT CONFLUENCE =     44.54

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       39.68    15.67       1.511         27.75
    2       44.54    22.35       1.265         32.50

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       70.90    15.67       1.511
    2       77.76    22.35       1.265

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     77.76   Tc(MIN.) =   22.35
TOTAL AREA(ACRES) =     60.25
LONGEST FLOWPATH FROM NODE    110.00 TO NODE    123.00 =  3790.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.265
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4923
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) =    1.95   SUBAREA RUNOFF(CFS) =    1.21
TOTAL AREA(ACRES) =    62.20   TOTAL RUNOFF(CFS) =   78.98
TC(MIN) =  22.35
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =     62.20  TC(MIN.) =     22.35
PEAK FLOW RATE(CFS)    =     78.98
*** PEAK FLOW RATE TABLE ***
        Q(CFS)   Tc(MIN.)
1        72.47      15.67
2        78.98      22.35
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-99 Advanced Engineering Software (aes)
            Ver. 1.5A Release Date: 01/01/99  License ID 1435

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 ************************** DESCRIPTION OF STUDY **************************
* FIRST INDUSTRIAL - INDIAN & NANDINA, MORENO VALLEY                       *
* PROPOSED CONDITION, 10-YEAR                                              *
* NODES 200-202                                                            *
 ***************************************************************************

  FILE NAME: C:\XDRIVE\3190\PR10B.DAT
  TIME/DATE OF STUDY: 16:43 09/27/2013
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.460
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.772
  SLOPE OF INTENSITY DURATION CURVE = 0.5000
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =   735.00
  UPSTREAM ELEVATION =   1476.60
  DOWNSTREAM ELEVATION =   1474.60
  ELEVATION DIFFERENCE =      2.00
  TC = 0.709*[(  735.00**3)/(     2.00)]**.2 =   32.393
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.051
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      2.11
  TOTAL AREA(ACRES) =      3.50   TOTAL RUNOFF(CFS) =      2.11

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
----------------------------------------------------------------------------
  ELEVATION DATA: UPSTREAM(FEET) =   1474.60  DOWNSTREAM(FEET) =   1472.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   735.00   CHANNEL SLOPE =  0.0026
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.11
  FLOW VELOCITY(FEET/SEC) =   0.88 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  13.85   Tc(MIN.) =  46.24
```

```
LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =  1470.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.880
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5354
SOIL CLASSIFICATION IS "C"
SUBAREA AREA(ACRES) =    5.90   SUBAREA RUNOFF(CFS) =    2.78
TOTAL AREA(ACRES) =     9.40   TOTAL RUNOFF(CFS) =    4.89
TC(MIN) =  46.24
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =      9.40  TC(MIN.) =     46.24
PEAK FLOW RATE(CFS)    =      4.89
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

1

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-99 Advanced Engineering Software (aes)
             Ver. 1.5A Release Date: 01/01/99  License ID 1435

                           Analysis prepared by:

                            THIENES ENGINEERING
                          16800 VALLEY VIEW AVENUE
                             LA MIRADA CA 90638
                   PH: (714) 521-4811 FAX: (714) 521-4173

 ************************** DESCRIPTION OF STUDY **************************
* FIRST INDUSTRIAL - INDIAN & NANDINA, MORENO VALLEY                       *
* PROPOSED CONDITION, 10-YEAR                                              *
* NODES 300-303                                                            *
 ****************************************************************************

  FILE NAME: C:\XDRIVE\3190\PR10C.DAT
  TIME/DATE OF STUDY: 15:11 09/30/2013
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.460
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.772
  SLOPE OF INTENSITY DURATION CURVE = 0.5000
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ======  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
      ASSUMED INITIAL SUBAREA UNIFORM
      DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =   385.00
  UPSTREAM ELEVATION =   1464.68
  DOWNSTREAM ELEVATION =   1462.74
  ELEVATION DIFFERENCE =      1.94
  TC = 0.303*[(  385.00**3)/(     1.94)]**.2 =    9.447
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.946
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8685
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      3.04
  TOTAL AREA(ACRES) =      1.80   TOTAL RUNOFF(CFS) =      3.04

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1465.93  DOWNSTREAM(FEET) =  1465.73
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  12.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.84
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.04
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =  10.03
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =   485.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.888
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8679
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =     1.10   SUBAREA RUNOFF(CFS) =     1.80
  TOTAL AREA(ACRES) =      2.90   TOTAL RUNOFF(CFS) =     4.84
  TC(MIN) =  10.03
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       2.90  TC(MIN.) =      10.03
  PEAK FLOW RATE(CFS)    =       4.84
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

1

```
****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
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            Ver. 1.5A Release Date: 01/01/99  License ID 1435

                         Analysis prepared by:

                          THIENES ENGINEERING
                        16800 VALLEY VIEW AVENUE
                           LA MIRADA CA 90638
                   PH: (714) 521-4811 FAX: (714) 521-4173

 ************************** DESCRIPTION OF STUDY **************************
* FIRST INDUSTRIAL - INDIAN & NANDINA, MORENO VALLEY                       *
* PROPOSED CONDITION, 100-YEAR                                             *
* NODES 100-123                                                            *
 ***************************************************************************

  FILE NAME: C:\XDRIVE\3190\PR100A.DAT
  TIME/DATE OF STUDY: 13:51 09/30/2013
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.460
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  SLOPE OF INTENSITY DURATION CURVE = 0.5000
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
       ASSUMED INITIAL SUBAREA UNIFORM
       DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =   620.00
  UPSTREAM ELEVATION =   1474.01
  DOWNSTREAM ELEVATION =   1468.58
  ELEVATION DIFFERENCE =      5.43
  TC = 0.303*[(  620.00**3)/(     5.43)]**.2 =   10.234
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.906
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8846
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      9.00
  TOTAL AREA(ACRES) =      3.50   TOTAL RUNOFF(CFS) =      9.00

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =   9
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   1468.58
  DOWNSTREAM NODE ELEVATION(FEET) =   1466.67
  CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.170
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
```

```
PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
MAXIMUM DEPTH(FEET) =   1.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.705
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8749
SOIL CLASSIFICATION IS "B"
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     17.58
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.86
AVERAGE FLOW DEPTH(FEET) =   0.50   FLOOD WIDTH(FEET) =   34.26
"V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.57   Tc(MIN.) =  11.81
SUBAREA AREA(ACRES) =    7.25       SUBAREA RUNOFF(CFS) =   17.16
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
TOTAL AREA(ACRES) =   10.75         PEAK FLOW RATE(CFS) =      26.16

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  0.56   FLOOD WIDTH(FEET) =   40.28
FLOW VELOCITY(FEET/SEC.) =   3.12   DEPTH*VELOCITY(FT*FT/SEC) =   1.75
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =   890.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1463.81  DOWNSTREAM(FEET) =  1462.81
FLOW LENGTH(FEET) =   500.00   MANNING'S N =  0.012
DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.98
ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     26.16
PIPE TRAVEL TIME(MIN.) =   1.67    Tc(MIN.) =  13.48
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =  1390.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.532
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8737
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) =    7.85   SUBAREA RUNOFF(CFS) =   17.36
TOTAL AREA(ACRES) =    18.60   TOTAL RUNOFF(CFS) =   43.52
TC(MIN) =  13.48

****************************************************************************
FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1462.81  DOWNSTREAM(FEET) =  1461.81
FLOW LENGTH(FEET) =   500.00   MANNING'S N =  0.012
DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.60
ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     43.52
PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =  14.97
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =  1890.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.403
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8820
SOIL CLASSIFICATION IS "C"
SUBAREA AREA(ACRES) =    9.15   SUBAREA RUNOFF(CFS) =   19.39
TOTAL AREA(ACRES) =    27.75   TOTAL RUNOFF(CFS) =   62.91
TC(MIN) =  14.97

****************************************************************************
FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1461.81  DOWNSTREAM(FEET) =  1461.69
```

```
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.13
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     62.91
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =  15.13
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =  1950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    123.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  15.13
  RAINFALL INTENSITY(INCH/HR) =   2.39
  TOTAL STREAM AREA(ACRES) =   27.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     62.91

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =   500.00
  UPSTREAM ELEVATION =   1474.01
  DOWNSTREAM ELEVATION =   1470.71
  ELEVATION DIFFERENCE =      3.30
  TC = 0.303*[(  500.00**3)/(     3.30)]**.2 =    9.937
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.949
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8764
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      5.69
  TOTAL AREA(ACRES) =      2.20   TOTAL RUNOFF(CFS) =      5.69

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.949
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6641
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.25   SUBAREA RUNOFF(CFS) =    2.45
  TOTAL AREA(ACRES) =     3.45   TOTAL RUNOFF(CFS) =    8.13
  TC(MIN) =   9.94

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =   9
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   1470.71
  DOWNSTREAM NODE ELEVATION(FEET) =   1469.05
  CHANNEL LENGTH THRU SUBAREA(FEET) =   205.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.170
  PAVEMENT LIP(FEET) =  0.020   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.783
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8754
  SOIL CLASSIFICATION IS "B"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     12.21
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.81
  AVERAGE FLOW DEPTH(FEET) =   0.45   FLOOD WIDTH(FEET) =   28.57
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.22   Tc(MIN.) =  11.15
  SUBAREA AREA(ACRES) =    3.35       SUBAREA RUNOFF(CFS) =    8.16
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =    6.80         PEAK FLOW RATE(CFS) =      16.29

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOOD WIDTH(FEET) =   32.36
  FLOW VELOCITY(FEET/SEC.) =   2.96   DEPTH*VELOCITY(FT*FT/SEC) =   1.43
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    112.00 =   705.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1466.32  DOWNSTREAM(FEET) =  1466.06
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.93
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     16.29
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =  11.87
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =   875.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.697
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8748
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.70   SUBAREA RUNOFF(CFS) =    6.37
  TOTAL AREA(ACRES) =     9.50   TOTAL RUNOFF(CFS) =   22.67
  TC(MIN) =  11.87

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1466.06  DOWNSTREAM(FEET) =  1465.81
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.28
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     22.67
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =  12.54
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    114.00 =  1045.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.625
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8743
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.70   SUBAREA RUNOFF(CFS) =    6.20
  TOTAL AREA(ACRES) =    12.20   TOTAL RUNOFF(CFS) =   28.86
  TC(MIN) =  12.54

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1465.81  DOWNSTREAM(FEET) =  1465.53
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  26.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.76
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     28.86
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =  13.13
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    115.00 =  1215.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.565
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8739
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    4.26
  TOTAL AREA(ACRES) =    14.10   TOTAL RUNOFF(CFS) =   33.12
  TC(MIN) =  13.13
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1465.53  DOWNSTREAM(FEET) =  1465.30
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.56
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     33.12
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =  13.75
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    116.00 =  1385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.506
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8735
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.70   SUBAREA RUNOFF(CFS) =    5.91
  TOTAL AREA(ACRES) =    16.80   TOTAL RUNOFF(CFS) =   39.03
  TC(MIN) =  13.75

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    117.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1465.30  DOWNSTREAM(FEET) =  1465.04
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.91
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     39.03
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =  14.33
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    117.00 =  1555.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.455
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8731
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    4.07
  TOTAL AREA(ACRES) =    18.70   TOTAL RUNOFF(CFS) =   43.11
  TC(MIN) =  14.33

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    118.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1465.04  DOWNSTREAM(FEET) =  1464.79
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.00
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     43.11
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =  14.90
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    118.00 =  1725.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    118.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.408
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8727
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.75   SUBAREA RUNOFF(CFS) =    5.78
  TOTAL AREA(ACRES) =    21.45   TOTAL RUNOFF(CFS) =   48.89
```

```
  TC(MIN) =  14.90

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1464.79  DOWNSTREAM(FEET) =  1464.53
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.15
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     48.89
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =  15.45
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    119.00 =  1895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.365
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8724
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.75   SUBAREA RUNOFF(CFS) =    5.67
  TOTAL AREA(ACRES) =    24.20   TOTAL RUNOFF(CFS) =   54.56
  TC(MIN) =  15.45

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1464.53  DOWNSTREAM(FEET) =  1464.28
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.26
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     54.56
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =  15.99
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    120.00 =  2065.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.325
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8720
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    3.85
  TOTAL AREA(ACRES) =    26.10   TOTAL RUNOFF(CFS) =   58.41
  TC(MIN) =  15.99

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1464.28  DOWNSTREAM(FEET) =  1464.02
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  38.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.38
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     58.41
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =  16.51
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    121.00 =  2235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    121.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.287
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8717
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    6.40   SUBAREA RUNOFF(CFS) =   12.76
```

```
TOTAL AREA(ACRES) =     32.50   TOTAL RUNOFF(CFS) =    71.17
TC(MIN) =  16.51

****************************************************************************
FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1464.02  DOWNSTREAM(FEET) =  1461.69
FLOW LENGTH(FEET) =  1555.00   MANNING'S N =  0.012
DEPTH OF FLOW IN  54.0 INCH PIPE IS  39.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.71
ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     71.17
PIPE TRAVEL TIME(MIN.) =   4.54    Tc(MIN.) =  21.05
LONGEST FLOWPATH FROM NODE    110.00 TO NODE    122.00 =  3790.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  21.05
RAINFALL INTENSITY(INCH/HR) =   2.03
TOTAL STREAM AREA(ACRES) =   32.50
PEAK FLOW RATE(CFS) AT CONFLUENCE =     71.17

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       62.91    15.13       2.390         27.75
    2       71.17    21.05       2.026         32.50

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1      114.06    15.13       2.390
    2      124.50    21.05       2.026

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =    124.50   Tc(MIN.) =   21.05
TOTAL AREA(ACRES) =     60.25
LONGEST FLOWPATH FROM NODE    110.00 TO NODE    123.00 =  3790.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.026
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5932
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) =    1.95   SUBAREA RUNOFF(CFS) =    2.34
TOTAL AREA(ACRES) =    62.20   TOTAL RUNOFF(CFS) =  126.85
TC(MIN) =  21.05
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =     62.20  TC(MIN.) =     21.05
PEAK FLOW RATE(CFS)    =    126.85
*** PEAK FLOW RATE TABLE ***
       Q(CFS)   Tc(MIN.)
1      116.97      15.13
2      126.85      21.05
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS

1
```

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-99 Advanced Engineering Software (aes)
             Ver. 1.5A Release Date: 01/01/99  License ID 1435

                          Analysis prepared by:

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                             LA MIRADA CA 90638
                    PH: (714) 521-4811 FAX: (714) 521-4173

 ************************* DESCRIPTION OF STUDY *************************
* FIRST INDUSTRIAL - INDIAN & NANDINA, MORENO VALLEY                    *
* PROPOSED CONDITION, 100-YEAR                                          *
* NODES 200-202                                                         *
 ************************************************************************

  FILE NAME: C:\XDRIVE\3190\PR100B.DAT
  TIME/DATE OF STUDY: 16:36 09/27/2013
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.460
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  SLOPE OF INTENSITY DURATION CURVE = 0.5000
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
N    (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS: UNDEVELOPED WITH FAIR COVER
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =   735.00
  UPSTREAM ELEVATION =   1476.60
  DOWNSTREAM ELEVATION =   1474.60
  ELEVATION DIFFERENCE =      2.00
  TC = 0.709*[(  735.00**3)/(     2.00)]**.2 =   32.393
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.633
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      3.76
  TOTAL AREA(ACRES) =      3.50   TOTAL RUNOFF(CFS) =      3.76

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1474.60  DOWNSTREAM(FEET) =   1472.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   735.00   CHANNEL SLOPE =  0.0026
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.76
  FLOW VELOCITY(FEET/SEC) =   1.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  12.20   Tc(MIN.) =  44.59
```

```
LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =  1470.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.392
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6292
SOIL CLASSIFICATION IS "C"
SUBAREA AREA(ACRES) =     5.90   SUBAREA RUNOFF(CFS) =     5.17
TOTAL AREA(ACRES) =      9.40   TOTAL RUNOFF(CFS) =     8.93
TC(MIN) =  44.59
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =      9.40  TC(MIN.) =      44.59
PEAK FLOW RATE(CFS)    =      8.93
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

1

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                      (RCFC&WCD)  1978 HYDROLOGY MANUAL
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                          Analysis prepared by:

                            THIENES ENGINEERING
                          16800 VALLEY VIEW AVENUE
                             LA MIRADA CA 90638
                   PH: (714) 521-4811 FAX: (714) 521-4173

 ************************** DESCRIPTION OF STUDY **************************
* FIRST INDUSTRIAL - INDIAN & NANDINA, MORENO VALLEY                       *
* PROPOSED CONDITION, 100-YEAR                                             *
* NODES 300-303                                                            *
 ****************************************************************************

  FILE NAME: C:\XDRIVE\3190\PR100C.DAT
  TIME/DATE OF STUDY: 15:13 09/30/2013
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.460
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.200
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  SLOPE OF INTENSITY DURATION CURVE = 0.5000
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
        FOR ALL DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  S       ASSUMED INITIAL SUBAREA UNIFORM
  SI      DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH =   385.00
  UPSTREAM ELEVATION =   1464.68
  DOWNSTREAM ELEVATION =   1462.74
  ELEVATION DIFFERENCE =      1.94
  TC = 0.303*[(  385.00**3)/(     1.94)]**.2 =    9.447
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.024
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8768
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      4.77
  TOTAL AREA(ACRES) =      1.80   TOTAL RUNOFF(CFS) =      4.77

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1465.93  DOWNSTREAM(FEET) =  1465.73
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.20
```

```
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       4.77
PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   9.97
LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =   485.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.944
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8764
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    2.84
TOTAL AREA(ACRES) =     2.90   TOTAL RUNOFF(CFS) =    7.61
TC(MIN) =   9.97
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =      2.90  TC(MIN.) =      9.97
PEAK FLOW RATE(CFS)    =      7.61
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

1

APPENDIX D

DETENTION CALCULATIONS

FIRST INDUSTRIAL - INDIAN & NANDINA, MORENO VALLEY
NORTHERLY TRUCK YARD

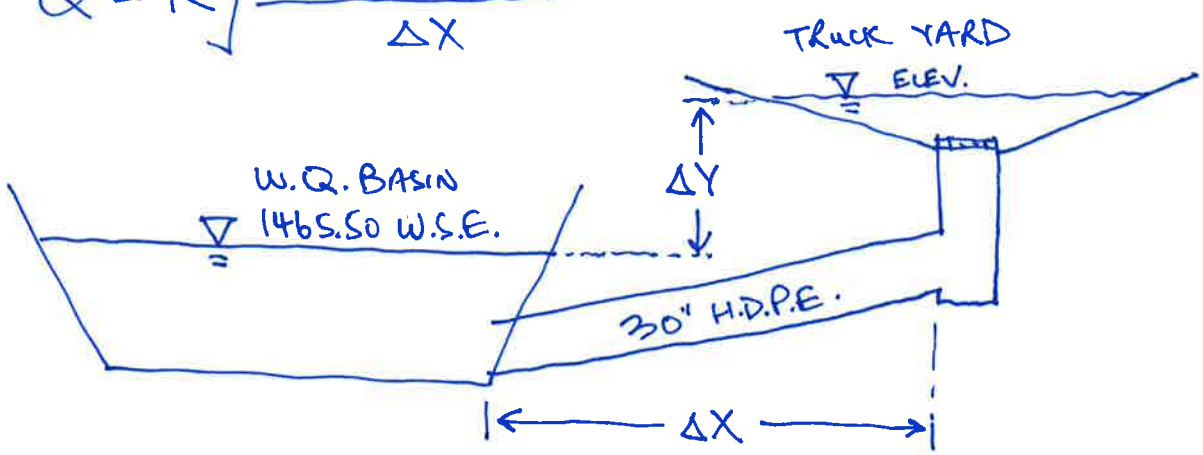
Elevation	Depth (feet)	Area (sq. ft.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)	Q (cfs)
1469.05	0.00	0				
			487	487	0.01	21.7
1469.20	0.15	6492				
			4310	4797	0.11	22.2
1469.40	0.35	36610				
			13093	17890	0.41	22.8
1469.60	0.55	94320				
			26391	44281	1.02	23.3
W.S.E. 1469.88 → 1469.80	0.75	169588				← Q(OUT) 23.5 CFS
			36632	80913	1.86	23.9
1470.00	0.95	196736				
			42306	123220	2.83	24.4
1470.20	1.15	226326				
			47460	170680	3.92	24.9
1470.40	1.35	248274				

$$S_f = \left(\frac{Q}{K}\right)^2$$

$$\Delta Y = S_f \cdot \Delta X = \left(\frac{Q}{K}\right)^2 \cdot \Delta X$$

$$ELEV = 1465.50 + \Delta Y = 1465.50 + \left[\left(\frac{Q}{K}\right)^2 \cdot \Delta X\right]$$

$$Q = K\sqrt{\frac{ELEV - 1465.50}{\Delta X}}$$



100YR	CFS Q(OUT)	DEPTH
1 HR	23.5	0.83
3 HR	23.2	0.73
6 HR	23.1	0.66
24 HR	19.3	0.13

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3190 INDIAN & NANDINA
NORTHERLY TRUCK YARD
100 YR 1 HR

Program License Serial Number 6061

********** HYDROGRAPH INFORMATION **********

From study/file name: 3190N1100.rte
**********HYDROGRAPH DATA**********
Number of intervals = 12
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 136.494 (CFS)
Total volume = 3.159 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

++
Process from Point/Station 121.000 to Point/Station 121.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 12
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.150	0.010	21.700	-0.065	0.085
0.350	0.110	22.200	0.034	0.186
0.550	0.410	22.800	0.331	0.489
0.750	1.020	23.300	0.940	1.100
0.950	1.860	23.900	1.778	1.942
1.150	2.830	24.400	2.746	2.914
1.350	3.920	24.900	3.834	4.006

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	34.1	68.25	102.37	136.49	Depth (Ft.)
0.083	18.66	16.46	0.008	OI					0.11
0.167	19.14	20.76	0.010	O					0.14
0.250	22.45	20.82	0.010	OI					0.14
0.333	22.45	21.74	0.018	O					0.17
0.417	26.24	21.83	0.035	OI					0.20
0.500	29.55	22.03	0.076	OI					0.28
0.583	33.81	22.26	0.142	O I					0.37
0.667	39.49	22.46	0.240	O	I				0.44
0.750	56.99	22.81	0.417	O	I				0.55
0.833	136.49	23.22	0.925	O				I	0.72
0.917	30.97	23.53	1.340	O I					0.83
1.000	22.45	23.54	1.362	O					0.83
1.083	0.00	23.48	1.277	I O					0.81
1.167	0.00	23.37	1.116	I O					0.77
1.250	0.00	23.25	0.956	I O					0.73
1.333	0.00	23.12	0.796	I O					0.68
1.417	0.00	22.99	0.637	I O					0.62
1.500	0.00	22.86	0.479	I O					0.57
1.583	0.00	22.63	0.323	I O					0.49
1.667	0.00	22.32	0.168	I O					0.39
1.750	0.00	21.73	0.016	I O					0.16
1.833	0.00	0.00	0.000	O					0.00

```
****************************HYDROGRAPH DATA****************************
                Number of intervals =    22
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       23.544 (CFS)
                Total volume =       3.218 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************

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3190 INDIAN & NANDINA
NORTHERLY TRUCK YARD
100 YR 3 HR

Program License Serial Number 6061

********** HYDROGRAPH INFORMATION **********

From study/file name: 3190N3100.rte
**********HYDROGRAPH DATA**********
Number of intervals = 36
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 60.237 (CFS)
Total volume = 4.861 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

++
Process from Point/Station 121.000 to Point/Station 121.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 36
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.150	0.010	21.700	-0.065	0.085
0.350	0.110	22.200	0.034	0.186
0.550	0.410	22.800	0.331	0.489
0.750	1.020	23.300	0.940	1.100
0.950	1.860	23.900	1.778	1.942
1.150	2.830	24.400	2.746	2.914
1.350	3.920	24.900	3.834	4.006

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 15.1 30.12 45.18 60.24	Depth (Ft.)
0.083	8.53	7.52	0.003	OI	0.05
0.167	8.53	9.30	0.004	O	0.06
0.250	7.03	6.62	0.003	O	0.05
0.333	10.03	9.99	0.005	O	0.07
0.417	10.03	10.06	0.005	O	0.07
0.500	12.28	11.99	0.006	O	0.08
0.583	10.03	10.52	0.005	O	0.07
0.667	12.28	11.64	0.005	O	0.08
0.750	12.28	12.76	0.006	O	0.09
0.833	10.03	9.92	0.005	O	0.07
0.917	10.78	10.77	0.005	O	0.07
1.000	12.28	12.11	0.006	O	0.08
1.083	15.28	15.05	0.007	OI	0.10
1.167	15.28	15.45	0.007	O	0.11
1.250	15.28	15.15	0.007	O	0.10
1.333	13.78	14.05	0.006	O	0.10
1.417	18.27	17.53	0.008	O	0.12
1.500	19.02	19.50	0.009	O	0.13
1.583	16.77	16.67	0.008	O	0.12
1.667	19.02	18.83	0.009	O	0.13
1.750	23.52	21.73	0.015	OI	0.16
1.833	22.02	21.76	0.023	O	0.18

```
1.917   20.52   21.75      0.019  |        | IO    |        |        |      0.17
2.000   21.27   21.72      0.013  |        |  O    |        |        |      0.16
2.083   22.02   21.71      0.013  |        |  O    |        |        |      0.16
2.167   30.26   21.86      0.043  |        |  O    I        |        |      0.22
2.250   36.26   22.22      0.120  |        |  O    |  I     |        |      0.36
2.333   25.02   22.34      0.178  |        |  O I  |        |        |      0.40
2.417   49.75   22.54      0.281  |        |  O    |        | I      |      0.46
2.500   53.49   22.86      0.480  |        |   O   |        |   I    |      0.57
2.583   60.24   23.05      0.713  |        |   O   |        |      I|      0.65
2.667   43.00   23.21      0.910  |        |   O   |     I  |        |      0.71
2.750   13.78   23.24      0.945  |       I|   O   |        |        |      0.73
2.833   12.28   23.18      0.875  |     I  |   O   |        |        |      0.70
2.917   12.28   23.12      0.800  |     I  |   O   |        |        |      0.68
3.000    3.29   23.03      0.695  |I       |   O   |        |        |      0.64
3.083    0.00   22.91      0.548  I        |   O   |        |        |      0.60
3.167    0.00   22.76      0.391  I        |   O   |        |        |      0.54
3.250    0.00   22.45      0.235  I        |  O    |        |        |      0.43
3.333    0.00   22.06      0.082  I        |  O    |        |        |      0.29
3.417    0.00    1.48      0.001  O        |       |        |        |      0.01
3.500    0.00    0.00      0.000  O        |       |        |        |      0.00

      ***************************HYDROGRAPH DATA***************************
                     Number of intervals =    42
                     Time interval =    5.0 (Min.)
                     Maximum/Peak flow rate =       23.239 (CFS)
                     Total volume =       4.865 (Ac.Ft)
             Status of hydrographs being held in storage
                        Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
             Peak (CFS)      0.000     0.000     0.000     0.000     0.000
             Vol (Ac.Ft)     0.000     0.000     0.000     0.000     0.000
      **********************************************************************

      ----------------------------------------------------------------------
```

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3190 INDIAN & NANDINA
NORTHERLY TRUCK YARD
100 YR 6 HR

Program License Serial Number 6061

********** HYDROGRAPH INFORMATION **********

From study/file name: 3190N6100.rte
**********HYDROGRAPH DATA**********
Number of intervals = 72
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 54.008 (CFS)
Total volume = 6.191 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

++
Process from Point/Station 121.000 to Point/Station 121.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 72
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.150	0.010	21.700	-0.065	0.085
0.350	0.110	22.200	0.034	0.186
0.550	0.410	22.800	0.331	0.489
0.750	1.020	23.300	0.940	1.100
0.950	1.860	23.900	1.778	1.942
1.150	2.830	24.400	2.746	2.914
1.350	3.920	24.900	3.834	4.006

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 13.5 27.00 40.51 54.01	Depth (Ft.)
0.083	3.72	3.28	0.002	OI	0.02
0.167	4.71	4.92	0.002	O	0.03
0.250	4.71	4.54	0.002	O	0.03
0.333	4.71	4.83	0.002	O	0.03
0.417	4.71	4.61	0.002	O	0.03
0.500	5.69	5.65	0.003	O	0.04
0.583	5.69	5.72	0.003	O	0.04
0.667	5.69	5.67	0.003	O	0.04
0.750	5.69	5.71	0.003	O	0.04
0.833	5.69	5.68	0.003	O	0.04
0.917	5.69	5.70	0.003	O	0.04
1.000	6.68	6.55	0.003	O	0.05
1.083	6.68	6.77	0.003	IO	0.05
1.167	6.68	6.60	0.003	O	0.05
1.250	6.68	6.73	0.003	O	0.05
1.333	6.68	6.64	0.003	O	0.05
1.417	6.68	6.71	0.003	O	0.05
1.500	6.68	6.65	0.003	O	0.05
1.583	6.68	6.70	0.003	O	0.05
1.667	6.68	6.66	0.003	O	0.05
1.750	6.68	6.69	0.003	O	0.05
1.833	6.68	6.67	0.003	O	0.05

```
1.917    6.68    6.68      0.003  |  O     |        |        |        |      0.05
2.000    7.66    7.54      0.003  |   O    |        |        |        |      0.05
2.083    6.68    6.89      0.003  |  IO    |        |        |        |      0.05
2.167    7.66    7.39      0.003  |   O    |        |        |        |      0.05
2.250    7.66    7.87      0.004  |   O    |        |        |        |      0.05
2.333    7.66    7.50      0.003  |   O    |        |        |        |      0.05
2.417    7.66    7.79      0.004  |   O    |        |        |        |      0.05
2.500    7.66    7.57      0.003  |   O    |        |        |        |      0.05
2.583    7.66    7.74      0.004  |   O    |        |        |        |      0.05
2.667    7.66    7.61      0.004  |   O    |        |        |        |      0.05
2.750    8.65    8.58      0.004  |    O   |        |        |        |      0.06
2.833    8.65    8.71      0.004  |    O   |        |        |        |      0.06
2.917    8.65    8.61      0.004  |    O   |        |        |        |      0.06
3.000    8.65    8.68      0.004  |    O   |        |        |        |      0.06
3.083    8.65    8.62      0.004  |    O   |        |        |        |      0.06
3.167    9.64    9.54      0.004  |    O   |        |        |        |      0.07
3.250    9.64    9.71      0.004  |    O   |        |        |        |      0.07
3.333    9.64    9.58      0.004  |    O   |        |        |        |      0.07
3.417   10.62   10.55      0.005  |     O  |        |        |        |      0.07
3.500   11.61   11.55      0.005  |     O  |        |        |        |      0.08
3.583   12.59   12.52      0.006  |      O|        |        |        |      0.09
3.667   12.59   12.65      0.006  |      O|        |        |        |      0.09
3.750   13.58   13.42      0.006  |      OI        |        |        |      0.09
3.833   13.58   13.70      0.006  |       O        |        |        |      0.09
3.917   14.57   14.36      0.007  |       O        |        |        |      0.10
4.000   14.57   14.73      0.007  |       O        |        |        |      0.10
4.083   15.55   15.31      0.007  |       |O       |        |        |      0.11
4.167   16.54   16.60      0.008  |       |O       |        |        |      0.11
4.250   17.52   17.36      0.008  |       | O      |        |        |      0.12
4.333   18.51   18.52      0.009  |       | O      |        |        |      0.13
4.417   19.50   19.37      0.009  |       |  O     |        |        |      0.13
4.500   19.50   19.59      0.009  |       |  O     |        |        |      0.14
4.583   20.48   20.29      0.009  |       |   O    |        |        |      0.14
4.667   21.47   21.50      0.010  |       |   O    |        |        |      0.15
4.750   22.45   21.71      0.012  |       |   OI   |        |        |      0.15
4.833   22.45   21.74      0.017  |       |   OI   |        |        |      0.16
4.917   23.44   21.78      0.026  |       |   OI   |        |        |      0.18
5.000   24.43   21.85      0.040  |       |   O I  |        |        |      0.21
5.083   29.36   22.02      0.074  |       |    O   |I       |        |      0.28
5.167   34.29   22.26      0.141  |       |    O   |   I    |        |      0.37
5.250   37.24   22.45      0.233  |       |    O   |     I  |        |      0.43
5.333   40.20   22.67      0.345  |       |    O   |      I|        |      0.51
5.417   45.13   22.86      0.482  |       |    O   |       | I      |      0.57
5.500   54.01   23.01      0.665  |       |    O   |       |       I|      0.63
5.583   17.52   23.08      0.753  |       | I  O   |       |        |      0.66
5.667    7.66   23.02      0.681  |   I   |    O   |       |        |      0.64
5.750    4.71   22.93      0.565  | I     |    O   |       |        |      0.60
5.833    3.72   22.82      0.437  | I     |    O   |       |        |      0.56
5.917    1.75   22.58      0.299  |I      |    O   |       |        |      0.48
6.000    0.76   22.29      0.153  I       |    O   |       |        |      0.38
6.083    0.00   20.27      0.009  I       |   O    |       |        |      0.14
6.167    0.00    0.00      0.000  O       |        |       |        |      0.00
```

```
****************************HYDROGRAPH DATA****************************
                Number of intervals =    74
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       23.081 (CFS)
                Total volume =       6.251 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)       0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************
```

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Study date: 09/30/13

3190 INDIAN & NANDINA
NORTHERLY TRUCK YARD
100 YR 24 HR

Program License Serial Number 6061

********** HYDROGRAPH INFORMATION **********

From study/file name: 3190N24100.rte
**********HYDROGRAPH DATA**********
Number of intervals = 288
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 19.079 (CFS)
Total volume = 10.057 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

++
Process from Point/Station 121.000 to Point/Station 121.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 288
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.150	0.010	21.700	-0.065	0.085
0.350	0.110	22.200	0.034	0.186
0.550	0.410	22.800	0.331	0.489
0.750	1.020	23.300	0.940	1.100
0.950	1.860	23.900	1.778	1.942
1.150	2.830	24.400	2.746	2.914
1.350	3.920	24.900	3.834	4.006

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 4.8 9.54 14.31 19.08	Depth (Ft.)
0.083	1.06	0.94	0.000	|O | | | |	0.01
0.167	1.06	1.16	0.001	|O | | | |	0.01
0.250	1.06	0.99	0.000	|O | | | |	0.01
0.333	1.60	1.59	0.001	| O | | | |	0.01
0.417	1.60	1.60	0.001	| O | | | |	0.01
0.500	1.60	1.59	0.001	| O | | | |	0.01
0.583	1.60	1.60	0.001	| O | | | |	0.01
0.667	1.60	1.60	0.001	| O | | | |	0.01
0.750	1.60	1.60	0.001	| O | | | |	0.01
0.833	0.29	0.45	0.000	O | | | |	0.00
0.917	0.30	0.19	0.000	O | | | |	0.00
1.000	0.31	0.40	0.000	O | | | |	0.00
1.083	1.60	1.38	0.001	| O | | | |	0.01
1.167	1.60	1.77	0.001	| O | | | |	0.01
1.250	1.60	1.47	0.001	| O | | | |	0.01
1.333	1.60	1.70	0.001	| O | | | |	0.01
1.417	1.60	1.52	0.001	| O | | | |	0.01
1.500	1.60	1.65	0.001	| O | | | |	0.01
1.583	1.60	1.55	0.001	| O | | | |	0.01
1.667	1.60	1.63	0.001	| O | | | |	0.01
1.750	1.60	1.57	0.001	| O | | | |	0.01
1.833	0.39	0.55	0.000	O | | | |	0.00

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1.917    0.40    0.27    0.000  O        |        |        |        |     0.00
2.000    0.41    0.50    0.000  O        |        |        |        |     0.00
2.083    0.42    0.34    0.000  O        |        |        |        |     0.00
2.167    0.42    0.48    0.000  O        |        |        |        |     0.00
2.250    0.43    0.39    0.000  O        |        |        |        |     0.00
2.333    0.44    0.47    0.000  O        |        |        |        |     0.00
2.417    0.45    0.42    0.000  O        |        |        |        |     0.00
2.500    0.45    0.47    0.000  O        |        |        |        |     0.00
2.583    1.05    0.97    0.000  |O       |        |        |        |     0.01
2.667    1.06    1.13    0.001  |O       |        |        |        |     0.01
2.750    1.07    1.02    0.000  |O       |        |        |        |     0.01
2.833    1.08    1.11    0.001  |O       |        |        |        |     0.01
2.917    1.09    1.06    0.000  |O       |        |        |        |     0.01
3.000    1.09    1.11    0.001  |O       |        |        |        |     0.01
3.083    1.10    1.08    0.000  |O       |        |        |        |     0.01
3.167    1.11    1.12    0.001  |O       |        |        |        |     0.01
3.250    1.12    1.11    0.001  |O       |        |        |        |     0.01
3.333    1.12    1.13    0.001  |O       |        |        |        |     0.01
3.417    1.13    1.13    0.001  |O       |        |        |        |     0.01
3.500    1.14    1.14    0.001  |O       |        |        |        |     0.01
3.583    1.15    1.14    0.001  |O       |        |        |        |     0.01
3.667    1.15    1.16    0.001  |O       |        |        |        |     0.01
3.750    1.16    1.16    0.001  |O       |        |        |        |     0.01
3.833    1.76    1.69    0.001  | O      |        |        |        |     0.01
3.917    1.77    1.82    0.001  | IO     |        |        |        |     0.01
4.000    1.78    1.74    0.001  | O      |        |        |        |     0.01
4.083    1.78    1.81    0.001  | IO     |        |        |        |     0.01
4.167    1.79    1.77    0.001  | OI     |        |        |        |     0.01
4.250    1.80    1.82    0.001  |  O     |        |        |        |     0.01
4.333    2.40    2.31    0.001  |  OI    |        |        |        |     0.02
4.417    2.41    2.47    0.001  |   O    |        |        |        |     0.02
4.500    2.41    2.36    0.001  |  OI    |        |        |        |     0.02
4.583    2.42    2.46    0.001  |   O    |        |        |        |     0.02
4.667    2.43    2.40    0.001  |   O    |        |        |        |     0.02
4.750    2.43    2.46    0.001  |   O    |        |        |        |     0.02
4.833    3.03    2.95    0.001  |   OI   |        |        |        |     0.02
4.917    3.04    3.11    0.001  |    O   |        |        |        |     0.02
5.000    3.05    3.00    0.001  |    O   |        |        |        |     0.02
5.083    1.87    2.05    0.001  |  O     |        |        |        |     0.01
5.167    1.88    1.74    0.001  | OI     |        |        |        |     0.01
5.250    1.89    1.99    0.001  |  O     |        |        |        |     0.01
5.333    2.49    2.34    0.001  |  OI    |        |        |        |     0.02
5.417    2.49    2.61    0.001  |   O    |        |        |        |     0.02
5.500    2.50    2.41    0.001  |   O    |        |        |        |     0.02
5.583    3.10    3.10    0.001  |    O   |        |        |        |     0.02
5.667    3.11    3.11    0.001  |    O   |        |        |        |     0.02
5.750    3.11    3.11    0.001  |    O   |        |        |        |     0.02
5.833    3.12    3.12    0.001  |    O   |        |        |        |     0.02
5.917    3.13    3.13    0.001  |    O   |        |        |        |     0.02
6.000    3.14    3.14    0.001  |    O   |        |        |        |     0.02
6.083    3.73    3.66    0.002  |     O  |        |        |        |     0.03
6.167    3.74    3.79    0.002  |     O  |        |        |        |     0.03
6.250    3.75    3.71    0.002  |     O  |        |        |        |     0.03
6.333    3.76    3.79    0.002  |     O  |        |        |        |     0.03
6.417    3.76    3.74    0.002  |     O  |        |        |        |     0.03
6.500    3.77    3.79    0.002  |     O  |        |        |        |     0.03
6.583    4.37    4.28    0.002  |      O|        |        |        |     0.03
6.667    4.37    4.44    0.002  |      O|        |        |        |     0.03
6.750    4.38    4.33    0.002  |      O|        |        |        |     0.03
6.833    4.39    4.43    0.002  |      O|        |        |        |     0.03
6.917    4.40    4.37    0.002  |      O|        |        |        |     0.03
7.000    4.40    4.42    0.002  |      O|        |        |        |     0.03
7.083    4.41    4.39    0.002  |      O|        |        |        |     0.03
7.167    4.42    4.43    0.002  |      O|        |        |        |     0.03
7.250    4.42    4.41    0.002  |      O|        |        |        |     0.03
7.333    5.02    4.96    0.002  |       O        |        |        |     0.03
7.417    5.03    5.08    0.002  |       O        |        |        |     0.04
7.500    5.04    5.00    0.002  |       O        |        |        |     0.03
7.583    5.63    5.59    0.003  |       |O       |        |        |     0.04
7.667    5.64    5.67    0.003  |       |O       |        |        |     0.04
7.750    5.65    5.62    0.003  |       |O       |        |        |     0.04
7.833    6.25    6.19    0.003  |       | O      |        |        |     0.04
7.917    6.25    6.29    0.003  |       | O      |        |        |     0.04
8.000    6.26    6.23    0.003  |       | O      |        |        |     0.04
8.083    7.45    7.33    0.003  |       |   O    |        |        |     0.05
8.167    7.46    7.54    0.003  |       |   O    |        |        |     0.05
8.250    7.46    7.39    0.003  |       |   O    |        |        |     0.05
8.333    7.47    7.52    0.003  |       |   O    |        |        |     0.05
8.417    7.48    7.43    0.003  |       |   O    |        |        |     0.05
8.500    7.48    7.51    0.003  |       |   O    |        |        |     0.05
8.583    8.08    7.99    0.004  |       |    O   |        |        |     0.06
8.667    8.09    8.16    0.004  |       |    O   |        |        |     0.06
8.750    8.09    8.04    0.004  |       |    O   |        |        |     0.06
8.833    8.69    8.66    0.004  |       |     O  |        |        |     0.06
8.917    8.70    8.72    0.004  |       |     O  |        |        |     0.06
9.000    8.70    8.69    0.004  |       |     O  |        |        |     0.06
9.083    9.89    9.77    0.005  |       |        O        |        |     0.07
9.167    9.90   10.00    0.005  |       |        O        |        |     0.07
9.250    9.91    9.83    0.005  |       |        O        |        |     0.07
9.333   10.50   10.49    0.005  |       |        |O       |        |     0.07
9.417   10.51   10.52    0.005  |       |        |O       |        |     0.07
9.500   10.52   10.51    0.005  |       |        |O       |        |     0.07
9.583   11.12   11.05    0.005  |       |        | O      |        |     0.08
9.667   11.12   11.17    0.005  |       |        | O      |        |     0.08
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 9.750   11.13   11.09    0.005 |        |        | O      |        |      0.08
 9.833   11.73   11.68    0.005 |        |        |  O     |        |      0.08
 9.917   11.73   11.76    0.005 |        |        |  O     |        |      0.08
10.000   11.74   11.71    0.005 |        |        |  O     |        |      0.08
10.083    7.60    8.11    0.004 |        |   IO   |        |        |      0.06
10.167    7.61    7.22    0.003 |        |   O    |        |        |      0.05
10.250    7.61    7.91    0.004 |        |   IO   |        |        |      0.05
10.333    7.62    7.39    0.003 |        |   O    |        |        |      0.05
10.417    7.63    7.80    0.004 |        |   IO   |        |        |      0.05
10.500    7.63    7.50    0.003 |        |   O    |        |        |      0.05
10.583   10.60   10.35    0.005 |        |        |O       |        |      0.07
10.667   10.60   10.79    0.005 |        |        |IO      |        |      0.07
10.750   10.61   10.46    0.005 |        |        |O       |        |      0.07
10.833   10.62   10.73    0.005 |        |        |O       |        |      0.07
10.917   10.62   10.54    0.005 |        |        |O       |        |      0.07
11.000   10.63   10.69    0.005 |        |        |O       |        |      0.07
11.083   10.04   10.06    0.005 |        |        O        |        |      0.07
11.167   10.05   10.03    0.005 |        |        O        |        |      0.07
11.250   10.05   10.07    0.005 |        |        O        |        |      0.07
11.333   10.06   10.05    0.005 |        |        O        |        |      0.07
11.417   10.07   10.07    0.005 |        |        O        |        |      0.07
11.500   10.07   10.07    0.005 |        |        O        |        |      0.07
11.583    8.89    9.04    0.004 |        |     IO|        |        |      0.06
11.667    8.90    8.79    0.004 |        |     O |        |        |      0.06
11.750    8.91    8.99    0.004 |        |     IO|        |        |      0.06
11.833    9.50    9.37    0.004 |        |      O|        |        |      0.06
11.917    9.51    9.61    0.004 |        |      IO        |        |      0.07
12.000    9.51    9.44    0.004 |        |      O|        |        |      0.07
12.083   13.66   13.23    0.006 |        |        |     O |        |      0.09
12.167   13.67   13.99    0.006 |        |        |     IO|        |      0.10
12.250   13.67   13.42    0.006 |        |        |     O |        |      0.09
12.333   14.27   14.39    0.007 |        |        |      IO        |      0.10
12.417   14.28   14.18    0.007 |        |        |      O|        |      0.10
12.500   14.28   14.35    0.007 |        |        |      IO        |      0.10
12.583   15.47   15.28    0.007 |        |        |       |O       |      0.11
12.667   15.48   15.62    0.007 |        |        |       |IO      |      0.11
12.750   15.48   15.37    0.007 |        |        |       |O       |      0.11
12.833   16.08   16.09    0.007 |        |        |       | O      |      0.11
12.917   16.08   16.07    0.007 |        |        |       | O      |      0.11
13.000   16.09   16.10    0.007 |        |        |       | IO     |      0.11
13.083   19.05   18.70    0.009 |        |        |       |      O|      0.13
13.167   19.06   19.33    0.009 |        |        |       |      IO      0.13
13.250   19.06   18.85    0.009 |        |        |       |      O|      0.13
13.333   19.07   19.23    0.009 |        |        |       |      IO      0.13
13.417   19.07   18.95    0.009 |        |        |       |      O|      0.13
13.500   19.08   19.17    0.009 |        |        |       |       O      0.13
13.583   12.58   13.27    0.006 |        |        |    IO |        |      0.09
13.667   12.58   12.05    0.006 |        |        |   OI  |        |      0.08
13.750   12.59   12.99    0.006 |        |        |   O   |        |      0.09
13.833   12.59   12.28    0.006 |        |        |   OI  |        |      0.08
13.917   12.60   12.83    0.006 |        |        |   O   |        |      0.09
14.000   12.60   12.42    0.006 |        |        |   OI  |        |      0.09
14.083   14.97   14.83    0.007 |        |        |       OI       |      0.10
14.167   14.98   15.09    0.007 |        |        |       |O       |      0.10
14.250   14.98   14.90    0.007 |        |        |       OI       |      0.10
14.333   14.40   14.53    0.007 |        |        |       O        |      0.10
14.417   14.40   14.30    0.007 |        |        |      OI        |      0.10
14.500   14.41   14.48    0.007 |        |        |       O        |      0.10
14.583   14.41   14.35    0.007 |        |        |       O        |      0.10
14.667   14.42   14.46    0.007 |        |        |       O        |      0.10
14.750   14.42   14.39    0.007 |        |        |       O        |      0.10
14.833   13.84   13.93    0.006 |        |        |      O|        |      0.10
14.917   13.84   13.77    0.006 |        |        |      O|        |      0.10
15.000   13.85   13.90    0.006 |        |        |      O|        |      0.10
15.083   13.26   13.29    0.006 |        |        |     O |        |      0.09
15.167   13.26   13.24    0.006 |        |        |     O |        |      0.09
15.250   13.27   13.28    0.006 |        |        |     O |        |      0.09
15.333   12.68   12.74    0.006 |        |        |    O  |        |      0.09
15.417   12.69   12.64    0.006 |        |        |    O  |        |      0.09
15.500   12.69   12.72    0.006 |        |        |    O  |        |      0.09
15.583   10.33   10.58    0.005 |        |        |O      |        |      0.07
15.667   10.33   10.14    0.005 |        |        |O      |        |      0.07
15.750   10.34   10.49    0.005 |        |        |O      |        |      0.07
15.833   10.34   10.23    0.005 |        |        |O      |        |      0.07
15.917   10.35   10.43    0.005 |        |        |O      |        |      0.07
16.000   10.35   10.29    0.005 |        |        |O      |        |      0.07
16.083    1.48    2.58    0.001 | I O    |        |        |        |      0.02
16.167    1.49    0.65    0.000 |OI      |        |        |        |      0.00
16.250    1.49    2.13    0.001 | IO     |        |        |        |      0.01
16.333    1.50    1.01    0.000 |OI      |        |        |        |      0.01
16.417    1.50    1.87    0.001 | IO     |        |        |        |      0.01
16.500    1.50    1.22    0.001 | O      |        |        |        |      0.01
16.583    0.92    1.20    0.001 |IO      |        |        |        |      0.01
16.667    0.92    0.70    0.000 |O       |        |        |        |      0.00
16.750    0.93    1.09    0.001 |O       |        |        |        |      0.01
16.833    0.93    0.80    0.000 |O       |        |        |        |      0.01
16.917    0.93    1.03    0.000 |O       |        |        |        |      0.01
17.000    0.94    0.86    0.000 |O       |        |        |        |      0.01
17.083    2.13    2.04    0.001 |  O     |        |        |        |      0.01
17.167    2.13    2.19    0.001 |  O     |        |        |        |      0.02
17.250    2.13    2.09    0.001 |  O     |        |        |        |      0.01
17.333    2.14    2.18    0.001 |  O     |        |        |        |      0.02
17.417    2.14    2.11    0.001 |  O     |        |        |        |      0.01
17.500    2.15    2.17    0.001 |  O     |        |        |        |      0.01
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17.583	2.15	2.13	0.001	| O	|	|	|	|	0.01
17.667	2.15	2.17	0.001	| O	|	|	|	|	0.01
17.750	2.16	2.15	0.001	| O	|	|	|	|	0.01
17.833	1.57	1.65	0.001	| O	|	|	|	|	0.01
17.917	1.58	1.52	0.001	| O	|	|	|	|	0.01
18.000	1.58	1.62	0.001	| O	|	|	|	|	0.01
18.083	1.58	1.55	0.001	| O	|	|	|	|	0.01
18.167	1.59	1.61	0.001	| O	|	|	|	|	0.01
18.250	1.59	1.57	0.001	| O	|	|	|	|	0.01
18.333	1.59	1.61	0.001	| O	|	|	|	|	0.01
18.417	1.60	1.59	0.001	| O	|	|	|	|	0.01
18.500	1.60	1.61	0.001	| O	|	|	|	|	0.01
18.583	1.01	1.08	0.000	|O	|	|	|	|	0.01
18.667	1.02	0.97	0.000	|O	|	|	|	|	0.01
18.750	1.02	1.06	0.000	|O	|	|	|	|	0.01
18.833	0.43	0.47	0.000	O	|	|	|	|	0.00
18.917	0.44	0.40	0.000	O	|	|	|	|	0.00
19.000	0.44	0.46	0.000	O	|	|	|	|	0.00
19.083	1.04	0.95	0.000	|O	|	|	|	|	0.01
19.167	1.04	1.11	0.001	|O	|	|	|	|	0.01
19.250	1.04	0.99	0.000	|O	|	|	|	|	0.01
19.333	1.64	1.61	0.001	| O	|	|	|	|	0.01
19.417	1.64	1.66	0.001	| O	|	|	|	|	0.01
19.500	1.64	1.63	0.001	| O	|	|	|	|	0.01
19.583	1.06	1.14	0.001	|O	|	|	|	|	0.01
19.667	1.06	1.00	0.000	|O	|	|	|	|	0.01
19.750	1.06	1.11	0.001	|O	|	|	|	|	0.01
19.833	0.47	0.51	0.000	O	|	|	|	|	0.00
19.917	0.48	0.45	0.000	O	|	|	|	|	0.00
20.000	0.48	0.50	0.000	O	|	|	|	|	0.00
20.083	1.08	0.99	0.000	|O	|	|	|	|	0.01
20.167	1.08	1.14	0.001	|O	|	|	|	|	0.01
20.250	1.08	1.03	0.000	|O	|	|	|	|	0.01
20.333	1.08	1.12	0.001	|O	|	|	|	|	0.01
20.417	1.09	1.06	0.000	|O	|	|	|	|	0.01
20.500	1.09	1.11	0.001	|O	|	|	|	|	0.01
20.583	1.09	1.08	0.000	|O	|	|	|	|	0.01
20.667	1.10	1.11	0.001	|O	|	|	|	|	0.01
20.750	1.10	1.09	0.001	|O	|	|	|	|	0.01
20.833	0.51	0.59	0.000	O	|	|	|	|	0.00
20.917	0.51	0.45	0.000	O	|	|	|	|	0.00
21.000	0.52	0.56	0.000	O	|	|	|	|	0.00
21.083	1.11	1.00	0.000	|O	|	|	|	|	0.01
21.167	1.11	1.19	0.001	|O	|	|	|	|	0.01
21.250	1.11	1.05	0.000	|O	|	|	|	|	0.01
21.333	0.53	0.64	0.000	IO	|	|	|	|	0.00
21.417	0.53	0.44	0.000	O	|	|	|	|	0.00
21.500	0.53	0.60	0.000	IO	|	|	|	|	0.00
21.583	1.12	1.00	0.000	|O	|	|	|	|	0.01
21.667	1.13	1.22	0.001	|IO	|	|	|	|	0.01
21.750	1.13	1.06	0.000	|O	|	|	|	|	0.01
21.833	0.54	0.66	0.000	IO	|	|	|	|	0.00
21.917	0.54	0.45	0.000	O	|	|	|	|	0.00
22.000	0.54	0.62	0.000	IO	|	|	|	|	0.00
22.083	1.14	1.01	0.000	|O	|	|	|	|	0.01
22.167	1.14	1.24	0.001	|IO	|	|	|	|	0.01
22.250	1.14	1.07	0.000	|O	|	|	|	|	0.01
22.333	0.55	0.68	0.000	IO	|	|	|	|	0.00
22.417	0.55	0.46	0.000	O	|	|	|	|	0.00
22.500	0.56	0.63	0.000	IO	|	|	|	|	0.00
22.583	0.56	0.50	0.000	O	|	|	|	|	0.00
22.667	0.56	0.60	0.000	IO	|	|	|	|	0.00
22.750	0.56	0.53	0.000	O	|	|	|	|	0.00
22.833	0.56	0.59	0.000	O	|	|	|	|	0.00
22.917	0.56	0.55	0.000	O	|	|	|	|	0.00
23.000	0.57	0.58	0.000	O	|	|	|	|	0.00
23.083	0.57	0.56	0.000	O	|	|	|	|	0.00
23.167	0.57	0.58	0.000	O	|	|	|	|	0.00
23.250	0.57	0.56	0.000	O	|	|	|	|	0.00
23.333	0.57	0.58	0.000	O	|	|	|	|	0.00
23.417	0.57	0.57	0.000	O	|	|	|	|	0.00
23.500	0.57	0.58	0.000	O	|	|	|	|	0.00
23.583	0.57	0.57	0.000	O	|	|	|	|	0.00
23.667	0.58	0.58	0.000	O	|	|	|	|	0.00
23.750	0.58	0.57	0.000	O	|	|	|	|	0.00
23.833	0.58	0.58	0.000	O	|	|	|	|	0.00
23.917	0.58	0.58	0.000	O	|	|	|	|	0.00
24.000	0.58	0.58	0.000	O	|	|	|	|	0.00
24.083	0.00	0.07	0.000	O	|	|	|	|	0.00

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****************************HYDROGRAPH DATA****************************
                Number of intervals =   289
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       19.330 (CFS)
                Total volume =      10.057 (Ac.Ft)
        Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)     0.000     0.000     0.000     0.000     0.000
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FIRST INDUSTRIAL - INDIAN & NANDINA, MORENO VALLEY
SOUTHERLY TRUCK YARD

Elevation	Depth (feet)	Area (sq. ft.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)	Q (cfs)
1466.67	0.00	0				
			65	65	0.00	27.0
1466.80	0.13	995				
			767	831	0.02	29.0
1467.00	0.33	6672				
			2400	3231	0.07	30.8
1467.20	0.53	17328				
			4990	8221	0.19	32.6
1467.40	0.73	32567				
			8470	16691	0.38	34.3
1467.60	0.93	52130				
			12837	29528	0.68	35.9 ← Q(OUT)
W.S.E. → 1467.80	1.13	76244				
			18291	47818	1.10	37.4
1468.00	1.33	106661				
			24900	72719	1.67	38.8
1468.20	1.53	142340				
			32349	105068	2.41	40.3
1468.40	1.73	181150				
			39997	145065	3.33	41.6
1468.60	1.93	218820				
			47213	192278	4.41	42.9
1468.80	2.13	253310				
			18182	210459	4.83	43.4
1468.87	2.20	266170				

100YR	Q(OUT) CFS	DEPTH
1 HR	35.9	1.13'
3 HR	33.6	0.85'
6 HR	32.1	0.68'
24 HR	16.3	0.08'

30" H.D.P.E.

1465.50 W.S.E. in W.Q. Basin

FLOOD HYDROGRAPH ROUTING PROGRAM
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Study date: 09/30/13

3190 INDIAN & NANDINA
SOUTHERLY TRUCK YARD
100 YR 1 HR

Program License Serial Number 6061

********** HYDROGRAPH INFORMATION **********

From study/file name: 3190S1100.rte
**********HYDROGRAPH DATA**********
Number of intervals = 12
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 116.193 (CFS)
Total volume = 2.689 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 104.000 to Point/Station 104.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 12
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.130	0.001	27.000	-0.092	0.094
0.330	0.020	29.000	-0.080	0.120
0.530	0.070	30.800	-0.036	0.176
0.730	0.190	32.600	0.078	0.302
0.930	0.380	34.300	0.262	0.498
1.130	0.680	35.900	0.556	0.804
1.330	1.100	37.400	0.971	1.229
1.530	1.670	38.800	1.536	1.804
1.730	2.410	40.300	2.271	2.549
1.930	3.330	41.600	3.187	3.473
2.130	4.410	42.900	4.262	4.558
2.200	4.830	43.400	4.681	4.979

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 29.0 58.10 87.14 116.19	Depth (Ft.)
0.083	15.89	15.72	0.001	| O | | | |	0.08
0.167	16.29	16.45	0.001	| O | | | |	0.08
0.250	19.11	18.92	0.001	| O | | | |	0.09
0.333	19.11	19.29	0.001	| O | | | |	0.09
0.417	22.33	22.12	0.001	| O | | | |	0.11
0.500	25.15	25.33	0.001	| O | | | |	0.12
0.583	28.78	27.42	0.005	| O| | | |	0.17
0.667	33.61	29.18	0.025	| OI | | |	0.35
0.750	48.52	31.25	0.100	| O I | | |	0.58
0.833	116.19	34.62	0.440	| |O | | I	0.97
0.917	26.36	35.93	0.688	| I|O | | |	1.13
1.000	19.11	35.47	0.599	| I |O | | |	1.08
1.083	0.00	34.53	0.424	I |O | | |	0.96
1.167	0.00	32.62	0.192	I O | | |	0.73
1.250	0.00	22.97	0.001	I O | | | |	0.11
1.333	0.00	0.00	0.000	O | | | |	0.00

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****************************HYDROGRAPH DATA****************************
                Number of intervals =    16
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       35.929 (CFS)
                Total volume =       2.767 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
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FLOOD HYDROGRAPH ROUTING PROGRAM
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Study date: 09/30/13

3190 INDIAN & NANDINA
SOUTHERLY TRUCK YARD
100 YR 3 HR

Program License Serial Number 6061

********** HYDROGRAPH INFORMATION **********

From study/file name: 3190S3100.rte
**********HYDROGRAPH DATA**********
Number of intervals = 36
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 51.277 (CFS)
Total volume = 4.138 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 104.000 to Point/Station 104.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 36
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.130	0.001	27.000	-0.092	0.094
0.330	0.020	29.000	-0.080	0.120
0.530	0.070	30.800	-0.036	0.176
0.730	0.190	32.600	0.078	0.302
0.930	0.380	34.300	0.262	0.498
1.130	0.680	35.900	0.556	0.804
1.330	1.100	37.400	0.971	1.229
1.530	1.670	38.800	1.536	1.804
1.730	2.410	40.300	2.271	2.549
1.930	3.330	41.600	3.187	3.473
2.130	4.410	42.900	4.262	4.558
2.200	4.830	43.400	4.681	4.979

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 12.8 25.64 38.46 51.28	Depth (Ft.)
0.083	7.26	7.18	0.000	| O | | | |	0.03
0.167	7.26	7.34	0.000	| O | | | |	0.04
0.250	5.99	5.93	0.000	| O | | | |	0.03
0.333	8.54	8.57	0.000	| O | | | |	0.04
0.417	8.54	8.51	0.000	| O | | | |	0.04
0.500	10.45	10.46	0.000	| O | | | |	0.05
0.583	8.54	8.55	0.000	| O | | | |	0.04
0.667	10.45	10.42	0.000	| O | | | |	0.05
0.750	10.45	10.48	0.000	| O | | | |	0.05
0.833	8.54	8.53	0.000	| O | | | |	0.04
0.917	9.18	9.18	0.000	| O | | | |	0.04
1.000	10.45	10.44	0.000	| O | | | |	0.05
1.083	13.00	12.99	0.000	| O | | | |	0.06
1.167	13.00	13.02	0.000	| O | | | |	0.06
1.250	13.00	12.99	0.000	| O | | | |	0.06
1.333	11.73	11.75	0.000	| O| | | |	0.06
1.417	15.55	15.49	0.001	| |O | | |	0.07

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1.500   16.19   16.25      0.001 |        | O     |        |        |      0.08
1.583   14.28   14.24      0.001 |        O       |        |        |      0.07
1.667   16.19   16.21      0.001 |        | O     |        |        |      0.08
1.750   20.02   19.97      0.001 |        |   O   |        |        |      0.10
1.833   18.74   18.81      0.001 |        |  O    |        |        |      0.09
1.917   17.47   17.42      0.001 |        | O     |        |        |      0.08
2.000   18.11   18.15      0.001 |        |  O    |        |        |      0.09
2.083   18.74   18.69      0.001 |        |  O    |        |        |      0.09
2.167   25.76   25.74      0.001 |        |       O        |        |      0.12
2.250   30.86   28.03      0.011 |        |       |O I     |        |      0.23
2.333   21.30   26.97      0.001 |        |    I  O        |        |      0.13
2.417   42.35   29.24      0.027 |        |       | O      | I      |      0.36
2.500   45.54   31.55      0.120 |        |       |  O     |   I    |      0.61
2.583   51.28   32.97      0.231 |        |       |   O    |        I      0.77
2.667   36.61   33.62      0.304 |        |       |   O I  |        |      0.85
2.750   11.73   33.06      0.241 |       I|       |   O    |        |      0.78
2.833   10.45   31.20      0.096 |      I |       |  O     |        |      0.57
2.917   10.45   17.50      0.001 |      I | O     |        |        |      0.08
3.000    2.80    0.00      0.000 OI       |       |        |        |      0.00
3.083    0.00    6.70      0.000 I   O    |       |        |        |      0.03
3.167    0.00    0.00      0.000 O        |       |        |        |      0.00
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****************************HYDROGRAPH DATA****************************
                Number of intervals =    38
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       33.624 (CFS)
                Total volume =       4.188 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)       0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
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FLOOD HYDROGRAPH ROUTING PROGRAM
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Study date: 09/30/13

3190 INDIAN & NANDINA
SOUTHERLY TRUCK YARD
100 YR 6 HR

Program License Serial Number 6061

********** HYDROGRAPH INFORMATION **********

From study/file name: 3190S6100.rte
**********HYDROGRAPH DATA**********
Number of intervals = 72
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 45.973 (CFS)
Total volume = 5.270 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 104.000 to Point/Station 104.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 72
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.130	0.001	27.000	-0.092	0.094
0.330	0.020	29.000	-0.080	0.120
0.530	0.070	30.800	-0.036	0.176
0.730	0.190	32.600	0.078	0.302
0.930	0.380	34.300	0.262	0.498
1.130	0.680	35.900	0.556	0.804
1.330	1.100	37.400	0.971	1.229
1.530	1.670	38.800	1.536	1.804
1.730	2.410	40.300	2.271	2.549
1.930	3.330	41.600	3.187	3.473
2.130	4.410	42.900	4.262	4.558
2.200	4.830	43.400	4.681	4.979

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	11.5	22.99	34.48	45.97	Depth (Ft.)
0.083	3.17	3.13	0.000	O					0.02
0.167	4.01	4.03	0.000	O					0.02
0.250	4.01	3.98	0.000	O					0.02
0.333	4.01	4.03	0.000	O					0.02
0.417	4.01	3.98	0.000	O					0.02
0.500	4.84	4.86	0.000	O					0.02
0.583	4.84	4.83	0.000	O					0.02
0.667	4.84	4.86	0.000	O					0.02
0.750	4.84	4.83	0.000	O					0.02
0.833	4.84	4.86	0.000	O					0.02
0.917	4.84	4.83	0.000	O					0.02
1.000	5.68	5.69	0.000	O					0.03
1.083	5.68	5.68	0.000	O					0.03
1.167	5.68	5.69	0.000	O					0.03
1.250	5.68	5.68	0.000	O					0.03
1.333	5.68	5.69	0.000	O					0.03
1.417	5.68	5.68	0.000	O					0.03

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1.500    5.68    5.69      0.000 |  O    |       |       |       |     0.03
1.583    5.68    5.68      0.000 |  O    |       |       |       |     0.03
1.667    5.68    5.69      0.000 |  O    |       |       |       |     0.03
1.750    5.68    5.68      0.000 |  O    |       |       |       |     0.03
1.833    5.68    5.69      0.000 |  O    |       |       |       |     0.03
1.917    5.68    5.68      0.000 |  O    |       |       |       |     0.03
2.000    6.52    6.52      0.000 |   O   |       |       |       |     0.03
2.083    5.68    5.70      0.000 |  O    |       |       |       |     0.03
2.167    6.52    6.50      0.000 |   O   |       |       |       |     0.03
2.250    6.52    6.55      0.000 |   O   |       |       |       |     0.03
2.333    6.52    6.50      0.000 |   O   |       |       |       |     0.03
2.417    6.52    6.55      0.000 |   O   |       |       |       |     0.03
2.500    6.52    6.50      0.000 |   O   |       |       |       |     0.03
2.583    6.52    6.55      0.000 |   O   |       |       |       |     0.03
2.667    6.52    6.50      0.000 |   O   |       |       |       |     0.03
2.750    7.36    7.38      0.000 |    O  |       |       |       |     0.04
2.833    7.36    7.35      0.000 |    O  |       |       |       |     0.04
2.917    7.36    7.37      0.000 |    O  |       |       |       |     0.04
3.000    7.36    7.35      0.000 |    O  |       |       |       |     0.04
3.083    7.36    7.37      0.000 |    O  |       |       |       |     0.04
3.167    8.20    8.18      0.000 |    O  |       |       |       |     0.04
3.250    8.20    8.22      0.000 |    O  |       |       |       |     0.04
3.333    8.20    8.18      0.000 |    O  |       |       |       |     0.04
3.417    9.04    9.05      0.000 |     O |       |       |       |     0.04
3.500    9.88    9.86      0.000 |     O |       |       |       |     0.05
3.583   10.72   10.73      0.000 |      O|       |       |       |     0.05
3.667   10.72   10.71      0.000 |      O|       |       |       |     0.05
3.750   11.56   11.56      0.000 |       O       |       |       |     0.06
3.833   11.56   11.56      0.000 |       O       |       |       |     0.06
3.917   12.40   12.39      0.000 |       O       |       |       |     0.06
4.000   12.40   12.41      0.000 |       O       |       |       |     0.06
4.083   13.24   13.22      0.000 |       |O      |       |       |     0.06
4.167   14.08   14.09      0.001 |       |O      |       |       |     0.07
4.250   14.92   14.90      0.001 |       | O     |       |       |     0.07
4.333   15.76   15.76      0.001 |       | O     |       |       |     0.08
4.417   16.60   16.58      0.001 |       |  O    |       |       |     0.08
4.500   16.60   16.61      0.001 |       |  O    |       |       |     0.08
4.583   17.44   17.41      0.001 |       |   O   |       |       |     0.08
4.667   18.27   18.29      0.001 |       |   O   |       |       |     0.09
4.750   19.11   19.09      0.001 |       |    O  |       |       |     0.09
4.833   19.11   19.14      0.001 |       |    O  |       |       |     0.09
4.917   19.95   19.92      0.001 |       |    O  |       |       |     0.10
5.000   20.79   20.82      0.001 |       |     O |       |       |     0.10
5.083   24.99   24.92      0.001 |       |       |O      |       |     0.12
5.167   29.19   27.59      0.007 |       |       |  OI   |       |     0.19
5.250   31.70   29.05      0.021 |       |       |   O I |       |     0.34
5.333   34.22   29.91      0.045 |       |       |   O  I|       |     0.43
5.417   38.42   31.03      0.086 |       |       |    O  | I     |     0.56
5.500   45.97   32.13      0.159 |       |       |     O |       I     0.68
5.583   14.92   31.96      0.148 |       | I     |     O |       |     0.66
5.667    6.52   28.35      0.014 |   I   |       |  O    |       |     0.26
5.750    4.01    0.00      0.000 O I     |       |       |       |     0.00
5.833    3.17   20.47      0.001 | I     |     O |       |       |     0.10
5.917    1.49    0.00      0.000 OI      |       |       |       |     0.00
6.000    0.65   17.22      0.001 I       |  O    |       |       |     0.08
6.083    0.00    0.00      0.000 O       |       |       |       |     0.00

    ***************************HYDROGRAPH DATA***************************
                    Number of intervals =    73
                    Time interval =    5.0 (Min.)
                    Maximum/Peak flow rate =       32.130 (CFS)
                    Total volume =       5.526 (Ac.Ft)
            Status of hydrographs being held in storage
                       Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)       0.000     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
    ***********************************************************************

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FLOOD HYDROGRAPH ROUTING PROGRAM
Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2005
Study date: 09/30/13

3190 INDIAN & NANDINA
SOUTHERLY TRUCK YARD
100 YR 24 HR

Program License Serial Number 6061

********** HYDROGRAPH INFORMATION **********

From study/file name: 3190S24100.rte
**********HYDROGRAPH DATA**********
Number of intervals = 288
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 16.241 (CFS)
Total volume = 8.561 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

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Process from Point/Station 104.000 to Point/Station 104.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 288
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.130	0.001	27.000	-0.092	0.094
0.330	0.020	29.000	-0.080	0.120
0.530	0.070	30.800	-0.036	0.176
0.730	0.190	32.600	0.078	0.302
0.930	0.380	34.300	0.262	0.498
1.130	0.680	35.900	0.556	0.804
1.330	1.100	37.400	0.971	1.229
1.530	1.670	38.800	1.536	1.804
1.730	2.410	40.300	2.271	2.549
1.930	3.330	41.600	3.187	3.473
2.130	4.410	42.900	4.262	4.558
2.200	4.830	43.400	4.681	4.979

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	4.1	8.12	12.18	16.24	Depth (Ft.)
0.083	0.91	0.90	0.000	|O	|	|	|	|	0.00
0.167	0.91	0.92	0.000	|O	|	|	|	|	0.00
0.250	0.91	0.90	0.000	|O	|	|	|	|	0.00
0.333	1.36	1.36	0.000	| O	|	|	|	|	0.01
0.417	1.36	1.36	0.000	| O	|	|	|	|	0.01
0.500	1.36	1.36	0.000	| O	|	|	|	|	0.01
0.583	1.36	1.36	0.000	| O	|	|	|	|	0.01
0.667	1.36	1.36	0.000	| O	|	|	|	|	0.01
0.750	1.36	1.36	0.000	| O	|	|	|	|	0.01
0.833	0.25	0.27	0.000	O	|	|	|	|	0.00
0.917	0.26	0.24	0.000	O	|	|	|	|	0.00
1.000	0.26	0.28	0.000	O	|	|	|	|	0.00
1.083	1.36	1.33	0.000	| O	|	|	|	|	0.01
1.167	1.36	1.39	0.000	| O	|	|	|	|	0.01
1.250	1.36	1.33	0.000	| O	|	|	|	|	0.01
1.333	1.36	1.38	0.000	| O	|	|	|	|	0.01
1.417	1.36	1.34	0.000	| O	|	|	|	|	0.01

1.500	1.36	1.38	0.000	O					0.01
1.583	1.36	1.34	0.000	O					0.01
1.667	1.36	1.38	0.000	O					0.01
1.750	1.36	1.34	0.000	O					0.01
1.833	0.33	0.37	0.000	O					0.00
1.917	0.34	0.31	0.000	O					0.00
2.000	0.35	0.38	0.000	O					0.00
2.083	0.35	0.32	0.000	O					0.00
2.167	0.36	0.39	0.000	O					0.00
2.250	0.37	0.34	0.000	O					0.00
2.333	0.37	0.40	0.000	O					0.00
2.417	0.38	0.35	0.000	O					0.00
2.500	0.39	0.41	0.000	O					0.00
2.583	0.90	0.87	0.000	O					0.00
2.667	0.90	0.94	0.000	O					0.00
2.750	0.91	0.88	0.000	O					0.00
2.833	0.92	0.95	0.000	O					0.00
2.917	0.92	0.89	0.000	O					0.00
3.000	0.93	0.96	0.000	O					0.00
3.083	0.94	0.91	0.000	O					0.00
3.167	0.94	0.97	0.000	O					0.00
3.250	0.95	0.92	0.000	O					0.00
3.333	0.96	0.98	0.000	O					0.00
3.417	0.96	0.94	0.000	O					0.00
3.500	0.97	0.99	0.000	O					0.00
3.583	0.98	0.95	0.000	O					0.00
3.667	0.98	1.01	0.000	O					0.00
3.750	0.99	0.97	0.000	O					0.00
3.833	1.50	1.52	0.000	O					0.01
3.917	1.51	1.49	0.000	O					0.01
4.000	1.51	1.53	0.000	IO					0.01
4.083	1.52	1.50	0.000	O					0.01
4.167	1.52	1.54	0.000	O					0.01
4.250	1.53	1.51	0.000	OI					0.01
4.333	2.04	2.05	0.000	O					0.01
4.417	2.05	2.04	0.000	O					0.01
4.500	2.05	2.06	0.000	O					0.01
4.583	2.06	2.05	0.000	O					0.01
4.667	2.07	2.08	0.000	O					0.01
4.750	2.07	2.06	0.000	O					0.01
4.833	2.58	2.59	0.000	O					0.01
4.917	2.59	2.59	0.000	O					0.01
5.000	2.60	2.60	0.000	O					0.01
5.083	1.59	1.60	0.000	O					0.01
5.167	1.60	1.59	0.000	O					0.01
5.250	1.61	1.61	0.000	O					0.01
5.333	2.12	2.10	0.000	O					0.01
5.417	2.12	2.13	0.000	O					0.01
5.500	2.13	2.12	0.000	O					0.01
5.583	2.64	2.64	0.000	O					0.01
5.667	2.64	2.64	0.000	O					0.01
5.750	2.65	2.66	0.000	O					0.01
5.833	2.66	2.65	0.000	O					0.01
5.917	2.66	2.67	0.000	O					0.01
6.000	2.67	2.66	0.000	O					0.01
6.083	3.18	3.18	0.000	O					0.02
6.167	3.18	3.18	0.000	O					0.02
6.250	3.19	3.19	0.000	O					0.02
6.333	3.20	3.20	0.000	O					0.02
6.417	3.20	3.20	0.000	O					0.02
6.500	3.21	3.21	0.000	O					0.02
6.583	3.72	3.71	0.000	O					0.02
6.667	3.72	3.73	0.000	O					0.02
6.750	3.73	3.72	0.000	O					0.02
6.833	3.74	3.74	0.000	O					0.02
6.917	3.74	3.74	0.000	O					0.02
7.000	3.75	3.75	0.000	O					0.02
7.083	3.75	3.75	0.000	O					0.02
7.167	3.76	3.76	0.000	O					0.02
7.250	3.77	3.76	0.000	O					0.02
7.333	4.27	4.27	0.000	O					0.02
7.417	4.28	4.28	0.000	O					0.02
7.500	4.29	4.29	0.000	O					0.02
7.583	4.80	4.79	0.000	O					0.02
7.667	4.80	4.81	0.000	O					0.02
7.750	4.81	4.80	0.000	O					0.02
7.833	5.32	5.32	0.000	O					0.03
7.917	5.32	5.32	0.000	O					0.03
8.000	5.33	5.33	0.000	O					0.03
8.083	6.34	6.33	0.000	O					0.03
8.167	6.35	6.36	0.000	O					0.03
8.250	6.35	6.34	0.000	O					0.03
8.333	6.36	6.37	0.000	O					0.03
8.417	6.36	6.35	0.000	O					0.03
8.500	6.37	6.38	0.000	O					0.03
8.583	6.88	6.86	0.000	O					0.03
8.667	6.88	6.90	0.000	O					0.03
8.750	6.89	6.88	0.000	O					0.03
8.833	7.40	7.41	0.000	O					0.04
8.917	7.40	7.40	0.000	O					0.04
9.000	7.41	7.42	0.000	O					0.04
9.083	8.42	8.40	0.000	O					0.04
9.167	8.43	8.44	0.000	O					0.04
9.250	8.43	8.42	0.000	O					0.04

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 9.333   8.94   8.95   0.000  |       |       |O      |       |   0.04
 9.417   8.95   8.94   0.000  |       |       |O      |       |   0.04
 9.500   8.95   8.96   0.000  |       |       |O      |       |   0.04
 9.583   9.46   9.45   0.000  |       |       | O     |       |   0.05
 9.667   9.47   9.48   0.000  |       |       | O     |       |   0.05
 9.750   9.47   9.46   0.000  |       |       | O     |       |   0.05
 9.833   9.98   9.99   0.000  |       |       |  O    |       |   0.05
 9.917   9.99   9.98   0.000  |       |       |  O    |       |   0.05
10.000   9.99  10.00   0.000  |       |       |  O    |       |   0.05
10.083   6.47   6.50   0.000  |       |   O   |       |       |   0.03
10.167   6.48   6.45   0.000  |       |   O   |       |       |   0.03
10.250   6.48   6.51   0.000  |       |   O   |       |       |   0.03
10.333   6.49   6.46   0.000  |       |   O   |       |       |   0.03
10.417   6.49   6.52   0.000  |       |   O   |       |       |   0.03
10.500   6.50   6.47   0.000  |       |   O   |       |       |   0.03
10.583   9.02   9.02   0.000  |       |       |O      |       |   0.04
10.667   9.03   9.03   0.000  |       |       |O      |       |   0.04
10.750   9.03   9.03   0.000  |       |       |O      |       |   0.04
10.833   9.04   9.04   0.000  |       |       |O      |       |   0.04
10.917   9.04   9.04   0.000  |       |       |O      |       |   0.04
11.000   9.05   9.05   0.000  |       |       |O      |       |   0.04
11.083   8.55   8.55   0.000  |       |       O       |       |   0.04
11.167   8.55   8.55   0.000  |       |       O       |       |   0.04
11.250   8.56   8.56   0.000  |       |       O       |       |   0.04
11.333   8.56   8.56   0.000  |       |       O       |       |   0.04
11.417   8.57   8.57   0.000  |       |       O       |       |   0.04
11.500   8.57   8.57   0.000  |       |       O       |       |   0.04
11.583   7.57   7.58   0.000  |       |     O |       |       |   0.04
11.667   7.58   7.56   0.000  |       |     O |       |       |   0.04
11.750   7.58   7.59   0.000  |       |     O |       |       |   0.04
11.833   8.09   8.07   0.000  |       |      O|       |       |   0.04
11.917   8.09   8.11   0.000  |       |      O|       |       |   0.04
12.000   8.10   8.08   0.000  |       |      O|       |       |   0.04
12.083  11.63  11.61   0.000  |       |       |     O |       |   0.06
12.167  11.63  11.65   0.000  |       |       |     O |       |   0.06
12.250  11.64  11.62   0.000  |       |       |     O |       |   0.06
12.333  12.15  12.16   0.000  |       |       |      O|       |   0.06
12.417  12.15  12.14   0.000  |       |       |      O|       |   0.06
12.500  12.16  12.17   0.000  |       |       |      O|       |   0.06
12.583  13.17  13.14   0.000  |       |       |       |O      |   0.06
12.667  13.17  13.20   0.000  |       |       |       |IO     |   0.06
12.750  13.18  13.16   0.000  |       |       |       |O      |   0.06
12.833  13.69  13.70   0.001  |       |       |       | O     |   0.07
12.917  13.69  13.67   0.001  |       |       |       | O     |   0.07
13.000  13.70  13.71   0.001  |       |       |       | IO    |   0.07
13.083  16.22  16.18   0.001  |       |       |       |      O|   0.08
13.167  16.22  16.26   0.001  |       |       |       |      IO   0.08
13.250  16.23  16.19   0.001  |       |       |       |      O|   0.08
13.333  16.23  16.27   0.001  |       |       |       |      IO   0.08
13.417  16.24  16.20   0.001  |       |       |       |      O|   0.08
13.500  16.24  16.28   0.001  |       |       |       |       O   0.08
13.583  10.71  10.73   0.000  |       |       |    O  |       |   0.05
13.667  10.71  10.69   0.000  |       |       |    O  |       |   0.05
13.750  10.71  10.74   0.000  |       |       |    O  |       |   0.05
13.833  10.72  10.70   0.000  |       |       |    O  |       |   0.05
13.917  10.72  10.74   0.000  |       |       |    O  |       |   0.05
14.000  10.73  10.71   0.000  |       |       |    O  |       |   0.05
14.083  12.75  12.74   0.000  |       |       |       |O      |   0.06
14.167  12.75  12.75   0.000  |       |       |       |O      |   0.06
14.250  12.76  12.75   0.000  |       |       |       |O      |   0.06
14.333  12.26  12.26   0.000  |       |       |       O       |   0.06
14.417  12.26  12.25   0.000  |       |       |       O       |   0.06
14.500  12.26  12.27   0.000  |       |       |       O       |   0.06
14.583  12.27  12.26   0.000  |       |       |       O       |   0.06
14.667  12.27  12.28   0.000  |       |       |       O       |   0.06
14.750  12.28  12.27   0.000  |       |       |       O       |   0.06
14.833  11.78  11.79   0.000  |       |       |      O|       |   0.06
14.917  11.78  11.77   0.000  |       |       |      O|       |   0.06
15.000  11.79  11.80   0.000  |       |       |      O|       |   0.06
15.083  11.29  11.28   0.000  |       |       |     O |       |   0.05
15.167  11.29  11.30   0.000  |       |       |     O |       |   0.05
15.250  11.29  11.29   0.000  |       |       |     O |       |   0.05
15.333  10.80  10.81   0.000  |       |       |    O  |       |   0.05
15.417  10.80  10.79   0.000  |       |       |    O  |       |   0.05
15.500  10.80  10.81   0.000  |       |       |    O  |       |   0.05
15.583   8.79   8.80   0.000  |       |       |O      |       |   0.04
15.667   8.80   8.79   0.000  |       |       |O      |       |   0.04
15.750   8.80   8.81   0.000  |       |       |O      |       |   0.04
15.833   8.80   8.79   0.000  |       |       |O      |       |   0.04
15.917   8.81   8.82   0.000  |       |       |O      |       |   0.04
16.000   8.81   8.80   0.000  |       |       |O      |       |   0.04
16.083   1.26   1.35   0.000  | O     |       |       |       |   0.01
16.167   1.27   1.18   0.000  | O     |       |       |       |   0.01
16.250   1.27   1.36   0.000  | O     |       |       |       |   0.01
16.333   1.27   1.19   0.000  | O     |       |       |       |   0.01
16.417   1.28   1.36   0.000  | O     |       |       |       |   0.01
16.500   1.28   1.20   0.000  | O     |       |       |       |   0.01
16.583   0.78   0.87   0.000  |O      |       |       |       |   0.00
16.667   0.78   0.70   0.000  |O      |       |       |       |   0.00
16.750   0.79   0.87   0.000  |O      |       |       |       |   0.00
16.833   0.79   0.71   0.000  |O      |       |       |       |   0.00
16.917   0.80   0.87   0.000  |O      |       |       |       |   0.00
17.000   0.80   0.72   0.000  |O      |       |       |       |   0.00
17.083   1.81   1.87   0.000  |  O    |       |       |       |   0.01
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17.167	1.81	1.75	0.000	| O	|	|	|	|	0.01
17.250	1.82	1.88	0.000	| O	|	|	|	|	0.01
17.333	1.82	1.76	0.000	| O	|	|	|	|	0.01
17.417	1.82	1.88	0.000	| O	|	|	|	|	0.01
17.500	1.83	1.77	0.000	| O	|	|	|	|	0.01
17.583	1.83	1.89	0.000	| O	|	|	|	|	0.01
17.667	1.83	1.78	0.000	| O	|	|	|	|	0.01
17.750	1.84	1.89	0.000	| O	|	|	|	|	0.01
17.833	1.34	1.29	0.000	| O	|	|	|	|	0.01
17.917	1.34	1.39	0.000	| O	|	|	|	|	0.01
18.000	1.34	1.30	0.000	| O	|	|	|	|	0.01
18.083	1.35	1.39	0.000	| O	|	|	|	|	0.01
18.167	1.35	1.31	0.000	| O	|	|	|	|	0.01
18.250	1.35	1.40	0.000	| O	|	|	|	|	0.01
18.333	1.36	1.32	0.000	| O	|	|	|	|	0.01
18.417	1.36	1.40	0.000	| O	|	|	|	|	0.01
18.500	1.36	1.32	0.000	| O	|	|	|	|	0.01
18.583	0.86	0.91	0.000	|O	|	|	|	|	0.00
18.667	0.87	0.82	0.000	|O	|	|	|	|	0.00
18.750	0.87	0.91	0.000	|O	|	|	|	|	0.00
18.833	0.37	0.33	0.000	O	|	|	|	|	0.00
18.917	0.37	0.41	0.000	O	|	|	|	|	0.00
19.000	0.37	0.34	0.000	O	|	|	|	|	0.00
19.083	0.88	0.91	0.000	|O	|	|	|	|	0.00
19.167	0.88	0.86	0.000	|O	|	|	|	|	0.00
19.250	0.89	0.91	0.000	|O	|	|	|	|	0.00
19.333	1.39	1.36	0.000	| O	|	|	|	|	0.01
19.417	1.40	1.43	0.000	| O	|	|	|	|	0.01
19.500	1.40	1.37	0.000	| O	|	|	|	|	0.01
19.583	0.90	0.93	0.000	|O	|	|	|	|	0.00
19.667	0.90	0.87	0.000	|O	|	|	|	|	0.00
19.750	0.90	0.94	0.000	|O	|	|	|	|	0.00
19.833	0.40	0.38	0.000	O	|	|	|	|	0.00
19.917	0.41	0.43	0.000	O	|	|	|	|	0.00
20.000	0.41	0.38	0.000	O	|	|	|	|	0.00
20.083	0.92	0.94	0.000	|O	|	|	|	|	0.00
20.167	0.92	0.90	0.000	|O	|	|	|	|	0.00
20.250	0.92	0.94	0.000	|O	|	|	|	|	0.00
20.333	0.92	0.90	0.000	|O	|	|	|	|	0.00
20.417	0.93	0.94	0.000	|O	|	|	|	|	0.00
20.500	0.93	0.91	0.000	|O	|	|	|	|	0.00
20.583	0.93	0.95	0.000	|O	|	|	|	|	0.00
20.667	0.93	0.91	0.000	|O	|	|	|	|	0.00
20.750	0.94	0.95	0.000	|O	|	|	|	|	0.00
20.833	0.43	0.42	0.000	O	|	|	|	|	0.00
20.917	0.44	0.45	0.000	O	|	|	|	|	0.00
21.000	0.44	0.43	0.000	O	|	|	|	|	0.00
21.083	0.94	0.95	0.000	|O	|	|	|	|	0.00
21.167	0.95	0.94	0.000	|O	|	|	|	|	0.00
21.250	0.95	0.95	0.000	|O	|	|	|	|	0.00
21.333	0.45	0.45	0.000	O	|	|	|	|	0.00
21.417	0.45	0.45	0.000	O	|	|	|	|	0.00
21.500	0.45	0.45	0.000	O	|	|	|	|	0.00
21.583	0.96	0.95	0.000	|O	|	|	|	|	0.00
21.667	0.96	0.96	0.000	|O	|	|	|	|	0.00
21.750	0.96	0.96	0.000	|O	|	|	|	|	0.00
21.833	0.46	0.47	0.000	O	|	|	|	|	0.00
21.917	0.46	0.45	0.000	O	|	|	|	|	0.00
22.000	0.46	0.47	0.000	O	|	|	|	|	0.00
22.083	0.97	0.95	0.000	|O	|	|	|	|	0.00
22.167	0.97	0.99	0.000	|O	|	|	|	|	0.00
22.250	0.97	0.96	0.000	|O	|	|	|	|	0.00
22.333	0.47	0.49	0.000	O	|	|	|	|	0.00
22.417	0.47	0.45	0.000	O	|	|	|	|	0.00
22.500	0.47	0.49	0.000	O	|	|	|	|	0.00
22.583	0.47	0.46	0.000	O	|	|	|	|	0.00
22.667	0.48	0.49	0.000	O	|	|	|	|	0.00
22.750	0.48	0.46	0.000	O	|	|	|	|	0.00
22.833	0.48	0.50	0.000	O	|	|	|	|	0.00
22.917	0.48	0.46	0.000	O	|	|	|	|	0.00
23.000	0.48	0.50	0.000	O	|	|	|	|	0.00
23.083	0.48	0.47	0.000	O	|	|	|	|	0.00
23.167	0.48	0.50	0.000	O	|	|	|	|	0.00
23.250	0.49	0.47	0.000	O	|	|	|	|	0.00
23.333	0.49	0.50	0.000	O	|	|	|	|	0.00
23.417	0.49	0.47	0.000	O	|	|	|	|	0.00
23.500	0.49	0.50	0.000	O	|	|	|	|	0.00
23.583	0.49	0.47	0.000	O	|	|	|	|	0.00
23.667	0.49	0.50	0.000	O	|	|	|	|	0.00
23.750	0.49	0.48	0.000	O	|	|	|	|	0.00
23.833	0.49	0.50	0.000	O	|	|	|	|	0.00
23.917	0.49	0.48	0.000	O	|	|	|	|	0.00
24.000	0.49	0.50	0.000	O	|	|	|	|	0.00
24.083	0.00	0.00	0.000	O	|	|	|	|	0.00

```
****************************HYDROGRAPH DATA****************************
                Number of intervals =   289
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       16.279 (CFS)
                Total volume =       8.561 (Ac.Ft)
        Status of hydrographs being held in storage
                     Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)     0.000     0.000     0.000     0.000     0.000
```

****

APPENDIX E

HYDROLOGY MAP