FINAL DRAINAGE REPORT

For

Moreno Valley Vogel Industrial

PA16-0002
APN: 316-210-19, 20, 57 and 77

PROJECT LOCATION

Southwest corner of Indian Street and
Grove View Road
City of Moreno Valley, CA

DEVELOPER

Sares Regis Group
18802 Bardeen Avenue
Irvine, CA 92612

PREPARED BY

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David White, P.E.
C52921, Exp 12/31/2016

PREPARATION DATE

August 15, 2016

HZ PROJECT NUMBER

R304806.01

Table of Contents

Title	Page
Introduction	1
Purpose	1
Existing Condition	1
Discussion	1
Hydrologic Analysis	2
Results	2

List of Appendices

Appendix A	Proposed Condition Hydrology Map
Appendix B	100-year Rational Method Hydrologic Analysis - Existing Condition - Proposed Condition - Indian Street
Appendix C	Hydraulic Analysus - WSPGW
Appendix D	Soil Group Map and Isohyetal Map
Appendix E	Reference Plans: Partial Perris Valley Master Drainage Plan DWG. 4-948

Introduction

This preliminary hydrology report has been prepared for Sares Regis Group. The project is a new development of an industrial warehouse facility located at the southwest corner of Indian Street and Grove View Road, in the City of Moreno Valley. The proposed building is approximately 446,350 square feet in size on approximately 19.6 acres of an undeveloped land.

Purpose

The purpose of this report is to present the drainage concept for the project and to determine the design flow rates and estimate storm drain sizes that will be needed for the project site. The hydrology map and calculations reflect the tributary areas and Q_{100} flows.

Existing Condition

The existing site grades range from a maximum elevation of 1471 feet in the northwest region of the site to a minimum elevation of 1465 feet in the southeast region of the site with less than one percent (1%) gradient. The runoff from the existing site flows from northwest to the southeast in a sheet flow condition and collects into a headwall inlet structure at the southeast corner of the site and then is conveyed to the public storm drain system in Indian Street which is a 6 foot high and 10 foot wide reinforced concrete box that has been designed to accept and convey the tributary 100-year peak storm event runoff.

Proposed Condition

For the proposed condition the site has been designed to generally drain in the same direction as the existing undeveloped condition. In compliance with the city, county and state guidelines the site has been designed to incorporate on site bio-retention basins to help mitigate the storm water generated by the developed site. The site will generally be graded to drain toward the easterly and south easterly end of the project site. The storm water will then be allowed to discharge into the open bio-retention basins and disperse into the filter media within the bottom of each basin. The basins have been sized to capture and treat the required volume of storm water based on the most current water quality management plan guidance material. By implementing these on-site bio-retention basins we have attempted to slow down and reduce the storm water volume and rate of runoff during the smaller storm events to help mimic the existing undeveloped conditions. Based on our preliminary calculations presented in our Water Quality Management Plan the required capture volume is 30,991 cubic feet of storm water and the basins are designed to capture 32,272 cubic feet of storm water. Once the on-site bio-retention basins reach capacity they will overflow into a catch basin at the southeast corner of the site and runoff is then conveyed into the underground storm drain system. The underground storm drain system is designed to capture and convey the tributary 100-year storm event peak runoff. The underground storm drain then connects to the existing public 42” RCP storm drain and joins to a 6 foot high, 10 foot wide reinforced concrete box that has been designed to accept and convey the 100-year peak storm event runoff from the adjacent tributary areas.

The proposed bio-retention basins have been designed to collect and filter the required storm water volume by sending the collected storm water through a filter media placed within the basin bottom. The design allows for the collected storm water to permeate through the media bottom and discharge to the storm drain system via 6” perforated pipes. The basins shall be maintained regularly to ensure that there is no standing water. To ensure compatibility with the March Air Reserve Base and Inland Airport operations, the proposed landscaping and vegetation in and around the retention basins and the project site will be selected in full compliance with the MARB and Inland Airport operation guidelines.

The off-site on the south side of the project site is developed as an industrial warehouse. The off-site on the west side of the project is current vacant, and the runoff sheet flows from northwest to southeast to an existing basin along the west side of the project site; moreover, overflow from the basin flows southerly and discharges to Perris Valley Channel. The off-site on the north side of the project site is vacant, and the majority runoff drains from west to east and is collected by an existing outlet in the Indian Street per as-built drawing "Perris Valley Master Drainage Plan DWG. 4-948, sheet 4". See Appendix E for reference plans.

Hydrologic Analysis

The hydrologic analysis was completed using the methodology outlined in the Riverside County Flood Control & Water Conservation District (RCFC&WCD) Hydrology Manual. Rational method hydrologic analyses were completed for the 100-year storm event using the AES software (Riverside County Module) Version 18.0. Hydraulic calculations were use the WSPGW program version 14.06 which is performed in Appendix C.

The site is situated within hydrologic soil types "C" as identified in the Hydrology Manual. A "Commercial" land use type has been assigned for the proposed site condition using AMC 3. The 100-year, 1-hour precipitation was taken from Plate D-4.4 and the Slope of Intensity Duration was taken from Plate D-4.6 of the Hydrology Manual.

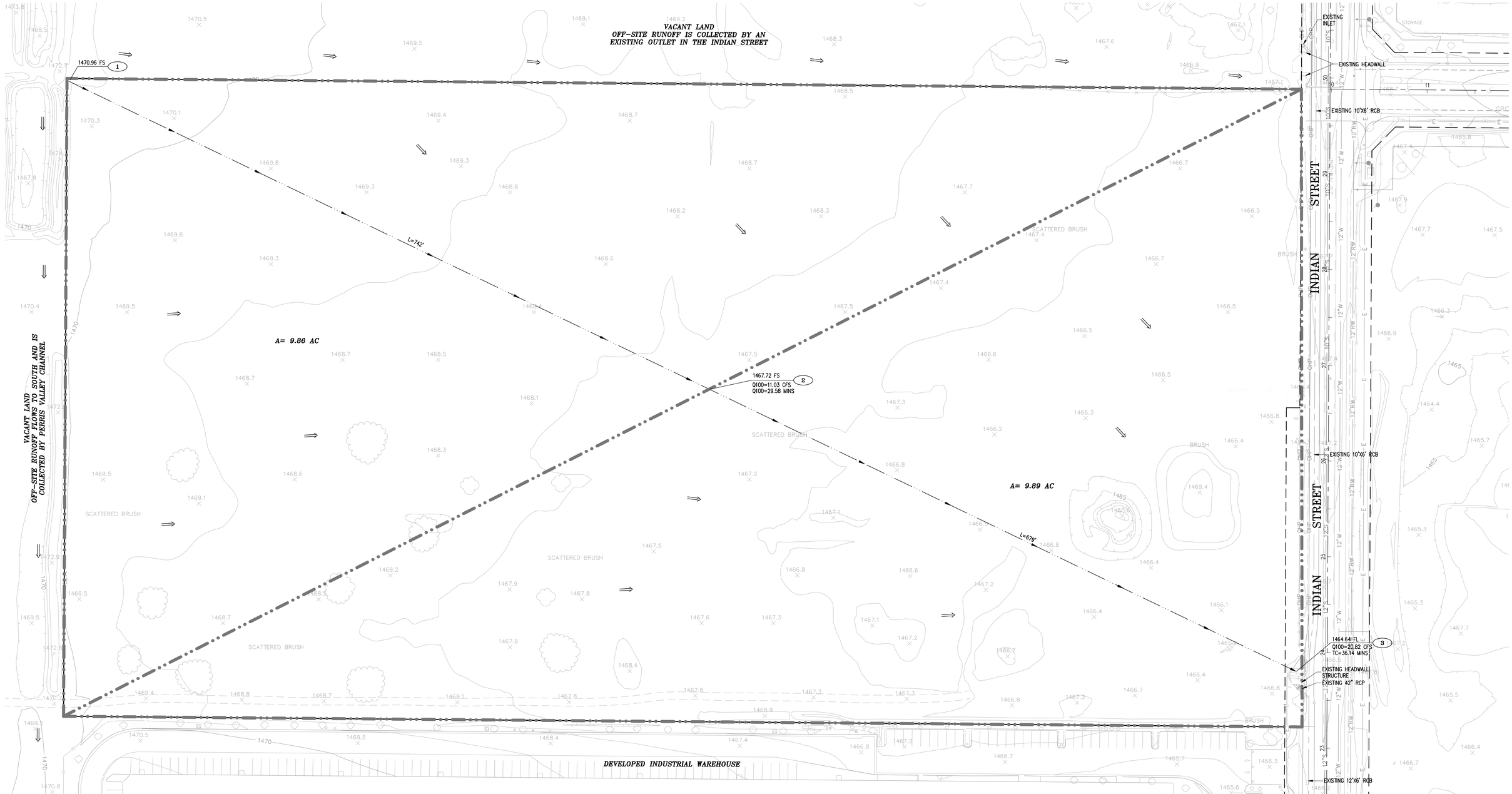
Results

Hydrologic analysis by AES calculation show that the total flow from the project site is Q_{100}=35.85 cfs at node 11. The existing public 42" RCP where the on-site storm drain is going to connect to was designed to collect 40.9 cfs from the as-built plan per Perris Valley Master Drainage Plan DWG. 4-948. See Appendix E for the as-built plan.

The results of the street capacity analysis show the depth of the water in the gutter to be 0.38' deep for the 100 year storm event. There is an existing inlet on Indian Street which captures all of the street runoff north of the subject property. See Appendix B for AES calculation.

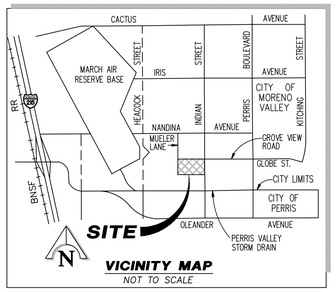
All proposed drainage and storm drain facilities are sized adequately for Q100 to protect the building from flooding. The hydraulic calculations is attached in the Appendix C.

Appendix A
Final Hydrology Map



LEGEND

(NO.)	HYDROLOGY MODEL NODE NUMBER
A= XXX.X AC	TRIBUTARY AREA IN ACRES
L= XXX.X	LENGTH OF FLOW
	DRAINAGE BOUNDARY
	FLOW DIRECTION



VICINITY MAP
NOT TO SCALE

SCALE: 1" = 40'

GRAPHIC SCALE
40 0 40 80 120
(IN FEET)
1" = 40'

BENCH MARK	BASIS OF BEARING
RIVERSIDE COUNTY FLOOD CONTROL BENCHMARK NO. M-31. ELEVATION 1474.674 (NGVD29) LOCATION 3 1/4" ALUMINUM DISK STAMPED "RIV. CO. BENCHMARK M-31 RESET APRIL 1996', FLUSH AT S.W. CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND R.C.F.C. CHANNEL (PERRIS LATERAL "A") 43 FT WEST OF THE CENTERLINE OF PERRIS BLVD. AND 4.5 FT EAST OF CONCRETE BRIDGE BARRIER	BEARINGS SHOWN HEREON ARE BASED ON THE BEARING BETWEEN CORS STATION PPBF AND CORS STATION MLFP BEING NORTH 53°30'18" WEST PER RECORDS ON FILE WITH THE CALIFORNIA SPATIAL REFERENCE CENTER (CSRC).

REGISTERED PROFESSIONAL ENGINEER
MAURICE H. MURAD
NO. 33366
EXPIRATION
6-30-2018
CIVIL
STATE OF CALIFORNIA

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PREPARED UNDER THE SUPERVISION OF:

MAURICE H. MURAD
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DATE

CITY OF MORENO VALLEY

HYDROLOGY MAP
EXISTING CONDITION
MORENO VALLEY VOGEL INDUSTRIAL

SHEET 1 NO. 1

VACANT LAND
OFF-SITE RUNOFF IS COLLECTED BY AN
EXISTING OUTLET IN THE INDIAN STREET

PROPERTY LINE

1468.76 FL
Q100=6.69 CFS

1465.25 FL
Q100=6.78 CFS
ΣQ100=13.47 CFS

1463.55 FL
Q100=13.47 CFS

EXISTING INLET
1468.00 FG

EXISTING HEADWALL PROTECT.IN PLACE

GROVE VIEW

EXISTING 10'X6' RCB

1472.50 FS

1469.22 FL
Q100=1.10 CFS

1471.50 FL
Q100=1.10 CFS

A= 0.32 AC
L= 114'

A= 2.92 AC
L= 719'

A= 3.40 AC

A= 0.43 AC

BIORETENTION BASIN 1

INDIAN STREET

1463.54 FL
Q100=0.81 CFS
ΣQ100=14.28 CFS

1463.53 FL
Q100=0.67 CFS
ΣQ100=14.95 CFS

1472.00 FF

1471.00 FF

1470.00 FF

1469.00 FF

1468.00 FF

0.5% BUILDING SLOPES @

0.5% BUILDING SLOPES @

1472.50 FS

PROPOSED BUILDING

A= 0.37 AC

EXIST. 10'X6' RCB
EXIST. 10" SEWER
EXIST. 12" WATER
EXIST. 12" RW

A=0.70 AC
L=210'

A= 0.44 AC

1463.52 FL
Q100=0.78 CFS
ΣQ100=15.73 CFS

VACANT LAND
OFF-SITE RUNOFF FLOWS TO SOUTH AND IS
COLLECTED BY PERRIS VALLEY CHANNEL

A= 0.30 AC

1469.00 FL
Q100=0.68 CFS
ΣQ100=1.78 CFS

A= 5.26 AC

A= 4.86 AC

1463.51 FL
Q100=15.73 CFS

A= 0.67 AC

BIORETENTION BASIN 2

1463.50 FL
1456.56 INV
Q100=1.14 CFS
ΣQ100=16.87 CFS

EXISTING 10'X6' RCB

PROP. STORM DRAIN

1464.29 FL
Q100=9.35 CFS
ΣQ100=11.13 CFS

1462.56 FL
Q100=8.11 CFS
ΣQ100=19.25 CFS

1458.18 INV
ΣQ100=35.85 CFS
TC=26.26 MIN

JOIN EXISTING 42" RCP
EXISTING 42" RCP
1457.73 INV
ΣQ100=35.85 CFS
TC=26.31 MIN

A= 0.58 AC

BIORETENTION BASIN 3

DEVELOPED INDUSTRIAL WAREHOUSE

PROPERTY LINE

1462.00 FL
1458.27 INV
Q100=0.91 CFS
ΣQ100=20.16 CFS

1465.77 FL
Q100=1.53 CFS

EXISTING 12'X6' RCB

44'

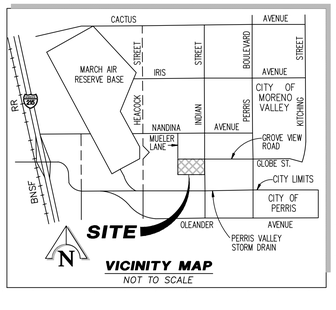
A=0.13 AC
L=172'

EXISTING 14' CATCH BASIN

1465.30 FL
Q100=0.26 CFS
ΣQ100=1.79 CFS

LEGEND

- (NO.) — HYDROLOGY MODEL NODE NUMBER
- A= XXX.X AC — TRIBUTARY AREA IN ACRES
- L= XXX.X — LENGTH OF FLOW
- DRAINAGE BOUNDARY
- DRAINAGE INLET/CATCH BASIN (CB)
- —SD— PROPOSED STORM DRAIN
- FLOW DIRECTION



VICINITY MAP
NOT TO SCALE

SCALE: 1"= 40'

GRAPHIC SCALE
40 0 40 80 120
(IN FEET)
1"=40'

BENCH MARK	BASIS OF BEARING
RIVERSIDE COUNTY FLOOD CONTROL BENCHMARK NO. M-31. ELEVATION 1474.674 (NGVD29) LOCATION 3 1/4" ALUMINUM DISK STAMPED "RIV. CO. BENCHMARK M-31 RESET APRIL 1996', FLUSH AT S.W. CORNER OF BRIDGE ON TOP OF SIDEWALK NEAR FACE OF CURB LOCATED AT THE CROSSING OF PERRIS BLVD. AND R.C.F.C. CHANNEL (PERRIS LATERAL "A") 43 FT WEST OF THE CENTERLINE OF PERRIS BLVD. AND 4.5 FT EAST OF CONCRETE BRIDGE BARRIER	BEARINGS SHOWN HEREON ARE BASED ON THE BEARING BETWEEN CORS STATION PPBF AND CORS STATION MUFP BEING NORTH 53°20'18" WEST PER RECORDS ON FILE WITH THE CALIFORNIA SPATIAL REFERENCE CENTER (CSRC).

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PREPARED UNDER THE SUPERVISION OF:

MAURICE H. MURAD — DATE
R.C.E. NO. 33366 EXP. 6/30/18

CITY OF MORENO VALLEY

HYDROLOGY MAP
POST CONSTRUCTION
MORENO VALLEY VOGEL INDUSTRIAL

SHEET 1 NO. 1

Appendix B
100-year Rational Method Hydrologic Analysis

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****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2014 Advanced Engineering Software (aes)
                    (Rational Tabling Version 21.0)
                Release Date: 06/01/2014  License ID 1202

                          Analysis prepared by:

                           Huitt-Zollars, Inc.
                         3990 Concours, Suite 330
                            Ontario, CA. 91764
                               909.941.1119

 *************************** DESCRIPTION OF STUDY **************************
* MORENO VALLEY VOGEL INDUSTRIAL                                            *
* 100 YEAR STORM EVENT - EXISTING CONDITION                                 *
* 3806EX                                                                    *
 ***************************************************************************

  FILE NAME: 3806EX.DAT
  TIME/DATE OF STUDY: 15:40 06/24/2016
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  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 = 0.4800
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR 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      1.00 TO NODE      2.00 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(FEET) =   742.00
  UPSTREAM ELEVATION(FEET) =   1470.96
  DOWNSTREAM ELEVATION(FEET) =   1467.72
```

```
ELEVATION DIFFERENCE(FEET) =       3.24
TC = 0.709*[(  742.00**3)/(     3.24)]**.2 =   29.582
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.685
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6640
SOIL CLASSIFICATION IS "C"
SUBAREA RUNOFF(CFS) =     11.03
TOTAL AREA(ACRES) =      9.86   TOTAL RUNOFF(CFS) =     11.03

****************************************************************************
FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1467.72  DOWNSTREAM(FEET) =   1464.64
CHANNEL LENGTH THRU SUBAREA(FEET) =   679.00   CHANNEL SLOPE =  0.0045
CHANNEL FLOW THRU SUBAREA(CFS) =      11.03
FLOW VELOCITY(FEET/SEC) =   1.73 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   6.56   Tc(MIN.) =   36.14
LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =    1421.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.531
UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6468
SOIL CLASSIFICATION IS "C"
SUBAREA AREA(ACRES) =    9.89   SUBAREA RUNOFF(CFS) =    9.79
TOTAL AREA(ACRES) =       19.8   TOTAL RUNOFF(CFS) =      20.82
TC(MIN.) =   36.14
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =       19.8  TC(MIN.) =     36.14
PEAK FLOW RATE(CFS)   =      20.82
============================================================================
============================================================================
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 1982-2014 Advanced Engineering Software (aes)
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                   Release Date: 06/01/2014  License ID 1202

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                          3990 Concours, Suite 330
                             Ontario, CA. 91764
                                909.941.1119

 ************************** DESCRIPTION OF STUDY **************************
* MORENO VALLEY VOGEL INDUSTRIAL                                           *
* 100 YEAR STORM EVENT                                                     *
* 100Q3806                                                                 *
 ***************************************************************************

  FILE NAME: 100Q3806.DAT
  TIME/DATE OF STUDY: 16:54 07/25/2016
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  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 = 0.4800
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR 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      1.00 TO NODE      2.00 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(FEET) =   719.00
  UPSTREAM ELEVATION(FEET) =   1472.50
  DOWNSTREAM ELEVATION(FEET) =   1468.76
```

```
  ELEVATION DIFFERENCE(FEET) =      3.74
  TC = 0.303*[(  719.00**3)/(     3.74)]**.2 =   12.052
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.593
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8831
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      6.69
  TOTAL AREA(ACRES) =      2.92   TOTAL RUNOFF(CFS) =      6.69

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1468.76  DOWNSTREAM ELEVATION(FEET) = 1465.25
  STREET LENGTH(FEET) =   673.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 34.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  29.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.038
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.038

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.018
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.63
    HALFSTREET FLOOD WIDTH(FEET) =   13.34
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.85
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.79
  STREET FLOW TRAVEL TIME(MIN.) =   3.93   Tc(MIN.) =   15.98
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.264
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8812
  SOIL CLASSIFICATION IS "C"
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    6.78
  TOTAL AREA(ACRES) =        6.3        PEAK FLOW RATE(CFS) =      13.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.69   HALFSTREET FLOOD WIDTH(FEET) =  16.19
  FLOW VELOCITY(FEET/SEC.) =  3.06   DEPTH*VELOCITY(FT*FT/SEC.) =   2.11
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =    1392.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1465.25  DOWNSTREAM(FEET) =   1463.55
  CHANNEL LENGTH THRU SUBAREA(FEET) =    12.00   CHANNEL SLOPE =  0.1417
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.263
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8812
  SOIL CLASSIFICATION IS "C"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.47
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.85
  AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =   0.01
  Tc(MIN.) =   16.00
  SUBAREA AREA(ACRES) =     0.00       SUBAREA RUNOFF(CFS) =    0.00
```

```
  TOTAL AREA(ACRES) =        6.3         PEAK FLOW RATE(CFS) =      13.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =  14.85
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =    1404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1463.55  DOWNSTREAM(FEET) =   1463.54
  CHANNEL LENGTH THRU SUBAREA(FEET) =   152.00   CHANNEL SLOPE =  0.0001
  CHANNEL BASE(FEET) =   22.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.022   MAXIMUM DEPTH(FEET) =   0.50

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.128
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8802
  SOIL CLASSIFICATION IS "C"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.16
  AVERAGE FLOW DEPTH(FEET) =   0.50   TRAVEL TIME(MIN.) =   2.19
  Tc(MIN.) =   18.19
  SUBAREA AREA(ACRES) =     0.43       SUBAREA RUNOFF(CFS) =    0.81
  TOTAL AREA(ACRES) =        6.8         PEAK FLOW RATE(CFS) =      14.28

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   1.19

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1556.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1463.54  DOWNSTREAM(FEET) =   1463.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =    83.00   CHANNEL SLOPE =  0.0001
  CHANNEL BASE(FEET) =   22.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.022   MAXIMUM DEPTH(FEET) =   0.50

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.067
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8798
SOIL CLASSIFICATION IS "C"
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.61
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.22
AVERAGE FLOW DEPTH(FEET) =   0.50   TRAVEL TIME(MIN.) =   1.14
Tc(MIN.) =   19.32
SUBAREA AREA(ACRES) =     0.37       SUBAREA RUNOFF(CFS) =    0.67
TOTAL AREA(ACRES) =        7.1         PEAK FLOW RATE(CFS) =      14.95

       ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
           CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
           ALLOWABLE DEPTH).
           AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
           ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   1.25

==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1639.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1463.53  DOWNSTREAM(FEET) =   1463.52
CHANNEL LENGTH THRU SUBAREA(FEET) =    87.00   CHANNEL SLOPE =  0.0001
CHANNEL BASE(FEET) =   22.00   "Z" FACTOR =   4.000
MANNING'S FACTOR = 0.022   MAXIMUM DEPTH(FEET) =   0.50

       ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
           CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
           ALLOWABLE DEPTH).
           AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
           ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.011
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8793
SOIL CLASSIFICATION IS "C"
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.34
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.28
AVERAGE FLOW DEPTH(FEET) =   0.50   TRAVEL TIME(MIN.) =   1.13
Tc(MIN.) =   20.46
SUBAREA AREA(ACRES) =     0.44       SUBAREA RUNOFF(CFS) =    0.78
TOTAL AREA(ACRES) =        7.6         PEAK FLOW RATE(CFS) =      15.73

       ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
           CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
           ALLOWABLE DEPTH).
           AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
           ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   1.31

==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH
```

```
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1726.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1463.52  DOWNSTREAM(FEET) =  1463.51
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.59
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.73
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   21.24
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1800.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1463.51  DOWNSTREAM(FEET) =   1463.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    85.00   CHANNEL SLOPE =  0.0001
  CHANNEL BASE(FEET) =   22.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.022   MAXIMUM DEPTH(FEET) =   0.50

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.931
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8787
  SOIL CLASSIFICATION IS "C"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.36
  AVERAGE FLOW DEPTH(FEET) =   0.50   TRAVEL TIME(MIN.) =   1.04
  Tc(MIN.) =   22.28
  SUBAREA AREA(ACRES) =     0.67       SUBAREA RUNOFF(CFS) =    1.14
  TOTAL AREA(ACRES) =        8.2         PEAK FLOW RATE(CFS) =      16.87

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   1.41

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1885.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1458.56  DOWNSTREAM(FEET) =  1458.18
  FLOW LENGTH(FEET) =   104.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.59
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.87
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   22.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1989.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 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.) =   22.59
  RAINFALL INTENSITY(INCH/HR) =   1.92
  TOTAL STREAM AREA(ACRES) =     8.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.87

****************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     10.20 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(FEET) =   114.00
  UPSTREAM ELEVATION(FEET) =   1472.50
  DOWNSTREAM ELEVATION(FEET) =   1471.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  TC = 0.303*[(  114.00**3)/(     1.00)]**.2 =    5.197
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.883
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8880
  SOIL CLASSIFICATION IS "C"
  SUBAREA RUNOFF(CFS) =      1.10
  TOTAL AREA(ACRES) =      0.32   TOTAL RUNOFF(CFS) =      1.10

****************************************************************************
  FLOW PROCESS FROM NODE     10.20 TO NODE     10.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1471.50  DOWNSTREAM(FEET) =   1469.22
  CHANNEL LENGTH THRU SUBAREA(FEET) =    14.00   CHANNEL SLOPE =  0.1629
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.868
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8879
  SOIL CLASSIFICATION IS "C"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.76
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   0.04
  Tc(MIN.) =    5.24
  SUBAREA AREA(ACRES) =     0.00       SUBAREA RUNOFF(CFS) =    0.00
  TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       1.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   5.77
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     10.30 =     128.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.30 TO NODE     10.40 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1469.22  DOWNSTREAM(FEET) =   1469.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   355.00   CHANNEL SLOPE =  0.0006
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.022   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.558
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8829
  SOIL CLASSIFICATION IS "C"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.83
  AVERAGE FLOW DEPTH(FEET) =   0.50   TRAVEL TIME(MIN.) =   7.16
  Tc(MIN.) =   12.40
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.68
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.56   FLOW VELOCITY(FEET/SEC.) =   0.87
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     10.40 =     483.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.40 TO NODE     10.50 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   1469.00
  DOWNSTREAM NODE ELEVATION(FEET) =   1464.29
  CHANNEL LENGTH THRU SUBAREA(FEET) =   826.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.080
  PAVEMENT LIP(FEET) =  0.030   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.021
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8794
  SOIL CLASSIFICATION IS "C"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.75
  AVERAGE FLOW DEPTH(FEET) =   0.28   FLOOD WIDTH(FEET) =   37.58
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   7.85   Tc(MIN.) =   20.25
  SUBAREA AREA(ACRES) =    5.26       SUBAREA RUNOFF(CFS) =    9.35
  TOTAL AREA(ACRES) =        5.9         PEAK FLOW RATE(CFS) =      11.13

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.33   FLOOD WIDTH(FEET) =   47.03
  FLOW VELOCITY(FEET/SEC.) =   1.95   DEPTH*VELOCITY(FT*FT/SEC) =   0.64
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     10.50 =    1309.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.50 TO NODE     10.60 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   1464.29
  DOWNSTREAM NODE ELEVATION(FEET) =   1462.56
  CHANNEL LENGTH THRU SUBAREA(FEET) =   334.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.080
```

```
  PAVEMENT LIP(FEET) =  0.030   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
  MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.900
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8784
  SOIL CLASSIFICATION IS "C"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     15.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.01
  AVERAGE FLOW DEPTH(FEET) =   0.37   FLOOD WIDTH(FEET) =   54.34
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.77   Tc(MIN.) =   23.02
  SUBAREA AREA(ACRES) =    4.86       SUBAREA RUNOFF(CFS) =    8.11
  TOTAL AREA(ACRES) =       10.7         PEAK FLOW RATE(CFS) =      19.25

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.39   FLOOD WIDTH(FEET) =   59.52
  FLOW VELOCITY(FEET/SEC.) =   2.13   DEPTH*VELOCITY(FT*FT/SEC) =   0.84
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     10.60 =    1643.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.60 TO NODE     10.70 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1462.56  DOWNSTREAM(FEET) =   1462.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   274.00   CHANNEL SLOPE =  0.0020
  CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.022   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.786
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8774
  SOIL CLASSIFICATION IS "C"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.70
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.43
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   3.19
  Tc(MIN.) =   26.21
  SUBAREA AREA(ACRES) =     0.58       SUBAREA RUNOFF(CFS) =    0.91
  TOTAL AREA(ACRES) =       11.3         PEAK FLOW RATE(CFS) =      20.16

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =   1.44
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     10.70 =    1917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.70 TO NODE     10.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1458.27  DOWNSTREAM(FEET) =  1457.90
  FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.83
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.16
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   26.26
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     10.00 =    1943.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 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.) =   26.26
  RAINFALL INTENSITY(INCH/HR) =   1.78
  TOTAL STREAM AREA(ACRES) =    11.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.16

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       16.87    22.59        1.918         8.23
      2       20.16    26.26        1.784        11.32

 **********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 ***************************************************************************

  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       34.21    22.59       1.918
      2       35.85    26.26       1.784

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      35.85   Tc(MIN.) =   26.26
  TOTAL AREA(ACRES) =       19.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1989.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1458.18  DOWNSTREAM(FEET) =  1457.73
  FLOW LENGTH(FEET) =    41.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.59
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.85
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   26.31
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    2030.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       19.6  TC(MIN.) =     26.31
  PEAK FLOW RATE(CFS)   =      35.85
============================================================================
============================================================================
  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 1982-2014 Advanced Engineering Software (aes)
                    (Rational Tabling Version 21.0)
                 Release Date: 06/01/2014  License ID 1202

                         Analysis prepared by:

                          Huitt-Zollars, Inc.
                        3990 Concours, Suite 330
                           Ontario, CA. 91764
                              909.941.1119

 ************************** DESCRIPTION OF STUDY **************************
* MORENO VALLEY VOGEL INDUSTRIAL                                           *
* 100 YEAR STORM EVENT - STREET CAPACITY                                   *
* 3806ST                                                                   *
 ***************************************************************************

  FILE NAME: 3806ST.DAT
  TIME/DATE OF STUDY: 14:15 04/01/2016
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  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 = 0.4800
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR 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     21.00 TO NODE     22.00 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(FEET) =   710.00
  UPSTREAM ELEVATION(FEET) =   1468.00
  DOWNSTREAM ELEVATION(FEET) =   1465.77
```

```
ELEVATION DIFFERENCE(FEET) =       2.23
TC = 0.303*[(  710.00**3)/(     2.23)]**.2 =   13.264
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.476
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8825
SOIL CLASSIFICATION IS "C"
SUBAREA RUNOFF(CFS) =      1.53
TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      1.53

****************************************************************************
FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  61
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) = 1465.77  DOWNSTREAM ELEVATION(FEET) = 1465.30
STREET LENGTH(FEET) =   172.00   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 32.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  27.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.66
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.37
  HALFSTREET FLOOD WIDTH(FEET) =   10.62
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.26
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.47
STREET FLOW TRAVEL TIME(MIN.) =   2.27   Tc(MIN.) =   15.54
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.295
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8814
SOIL CLASSIFICATION IS "C"
SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.26
TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =       1.79

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  11.04
FLOW VELOCITY(FEET/SEC.) =  1.27   DEPTH*VELOCITY(FT*FT/SEC.) =   0.48
LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =     882.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =        0.8  TC(MIN.) =     15.54
PEAK FLOW RATE(CFS)   =       1.79
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

Appendix C
Hydraulic Analysis - WSPGW

```
                                                  4806LINE-A.WSW
T1 SARES REGIS MORENO VALLEY INDUSTRIAL                                          0
T2 100 YEAR STORM EVENT
T3 ON-SITE STORM DRAIN LINE A
SO    109.1901457.710  1                          1462.400
R     115.0101458.090  1      .012                                .000    .000 0
R     140.4101458.180  1      .012                                .000    .000 0
JX    145.5001458.200  2  2   .012   18.980         1458.190      45.0          .000
R     171.8201458.290  2      .012                                .000    .000 0
R     189.5701458.350  2      .012                              45.000    .000 0
R     250.1201458.560  2      .012                                .000    .000 0
SH    250.1201458.560  2                          1458.560
CD   1  4   1    .000   3.500     .000  .000  .000   .00
CD   2  4   1    .000   2.000     .000  .000  .000   .00
Q            16.870   .0
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Program Package Serial Number: 1404

WATER SURFACE PROFILE LISTING Date: 7-27-2016 Time:10:52: 4

SARES REGIS MORENO VALLEY INDUSTRIAL

100 YEAR STORM EVENT

ON-SITE STORM DRAIN LINE A

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
109.190	1457.710	4.690	1462.400	35.85	3.73	.22	1462.62	.00	1.86	.00	3.500	.000	.00	1 .0
5.820	.0653					.0011	.01	4.69	.00	.85	.012	.00	.00	PIPE
115.010	1458.090	4.316	1462.406	35.85	3.73	.22	1462.62	.00	1.86	.00	3.500	.000	.00	1 .0
25.400	.0035					.0011	.03	4.32	.00	1.86	.012	.00	.00	PIPE
140.410	1458.180	4.254	1462.434	35.85	3.73	.22	1462.65	.00	1.86	.00	3.500	.000	.00	1 .0
JUNCT STR	.0039					.0029	.01	4.25	.00		.012	.00	.00	PIPE
145.500	1458.200	4.063	1462.263	16.87	5.37	.45	1462.71	.00	1.48	.00	2.000	.000	.00	1 .0
26.320	.0034					.0047	.12	4.06	.00	2.00	.012	.00	.00	PIPE
171.820	1458.290	4.098	1462.388	16.87	5.37	.45	1462.84	.00	1.48	.00	2.000	.000	.00	1 .0
17.750	.0034					.0047	.08	.00	.00	2.00	.012	.00	.00	PIPE
189.570	1458.350	4.186	1462.536	16.87	5.37	.45	1462.98	.00	1.48	.00	2.000	.000	.00	1 .0
60.550	.0035					.0047	.29	4.19	.00	2.00	.012	.00	.00	PIPE
250.120	1458.560	4.262	1462.822	16.87	5.37	.45	1463.27	.00	1.48	.00	2.000	.000	.00	1 .0

```
                                                  4806LAT-A1.WSW
T1 SARES REGIS MORENO VALLEY INDUSTRIAL                                          0
T2 100 YEAR STORM EVENT
T3 ON-SITE STORM DRAIN LAT. A-1
SO    102.3201458.190  1                          1462.263
R     126.5001458.270  1      .012                                .000    .000 0
SH    126.5001458.270  1                          1458.270
CD   1  4   1    .000   2.000     .000  .000  .000   .00
Q            20.160   .0
```

Program Package Serial Number: 1404

WATER SURFACE PROFILE LISTING Date: 7-27-2016 Time:11: 0:15

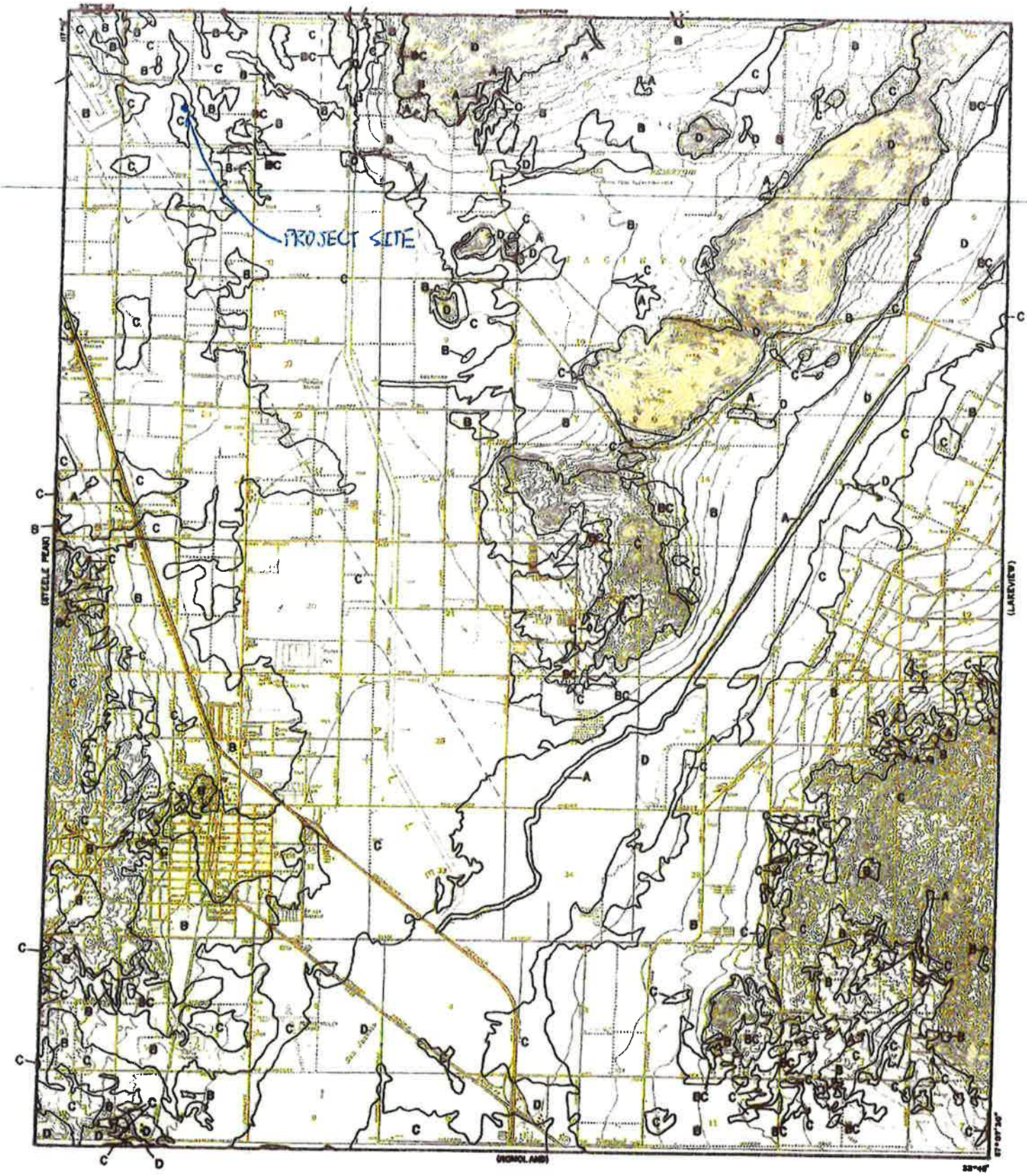
SARES REGIS MORENO VALLEY INDUSTRIAL

100 YEAR STORM EVENT

ON-SITE STORM DRAIN LAT. A-1

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
102.320	1458.190	4.073	1462.263	20.16	6.42	.64	1462.90	.00	1.61	.00	2.000	.000	.00	1 .0
24.180	.0033					.0068	.16	4.07	.00	2.00	.012	.00	.00	PIPE
126.500	1458.270	4.157	1462.427	20.16	6.42	.64	1463.07	.00	1.61	.00	2.000	.000	.00	1 .0

Appendix D
Soil Group Map and Isohyetal Map



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

N

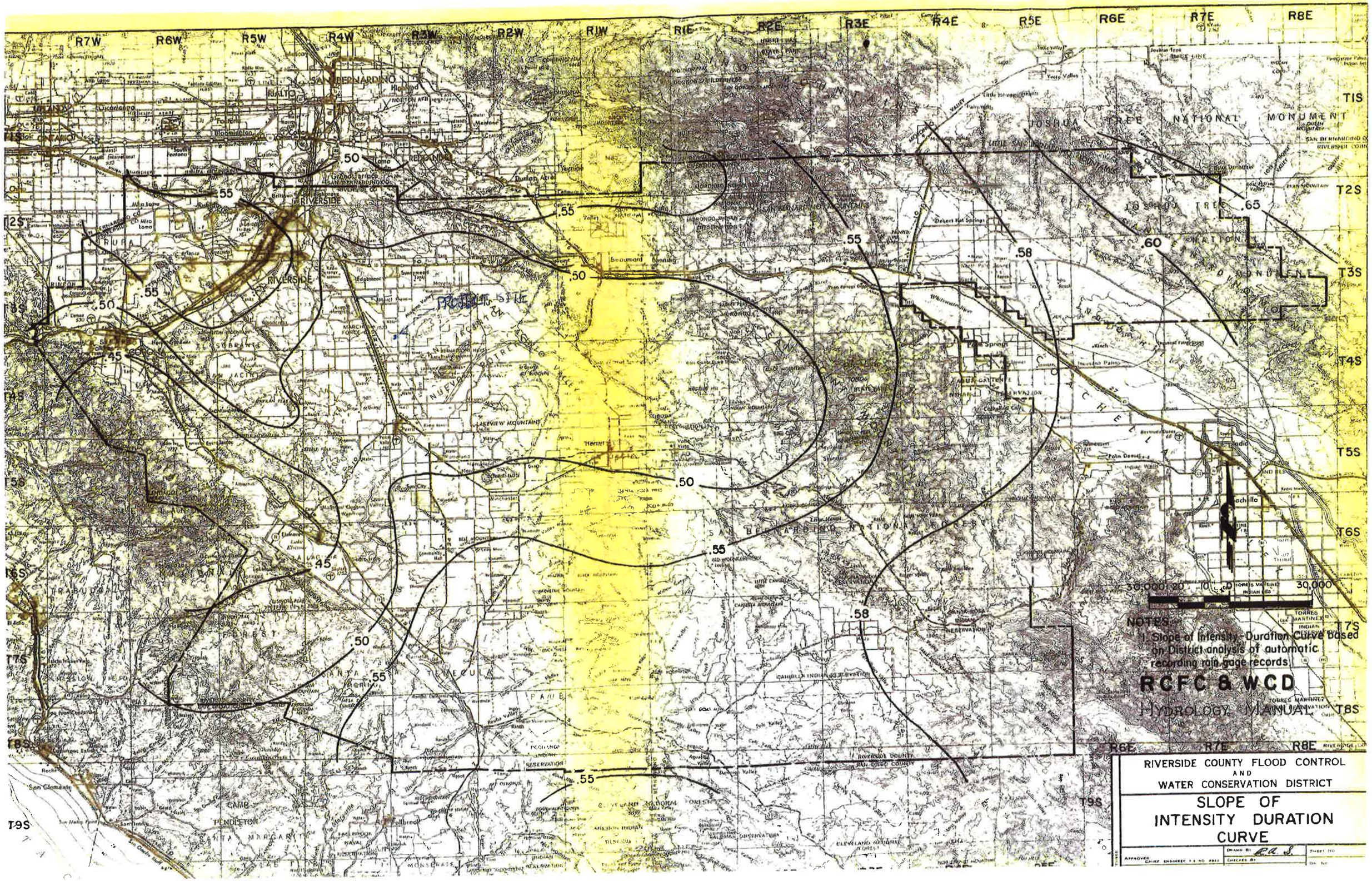
0 FEET 5000

HYDROLOGIC SOILS GROUP MAP

FOR

PERRIS

PLATE C-1.30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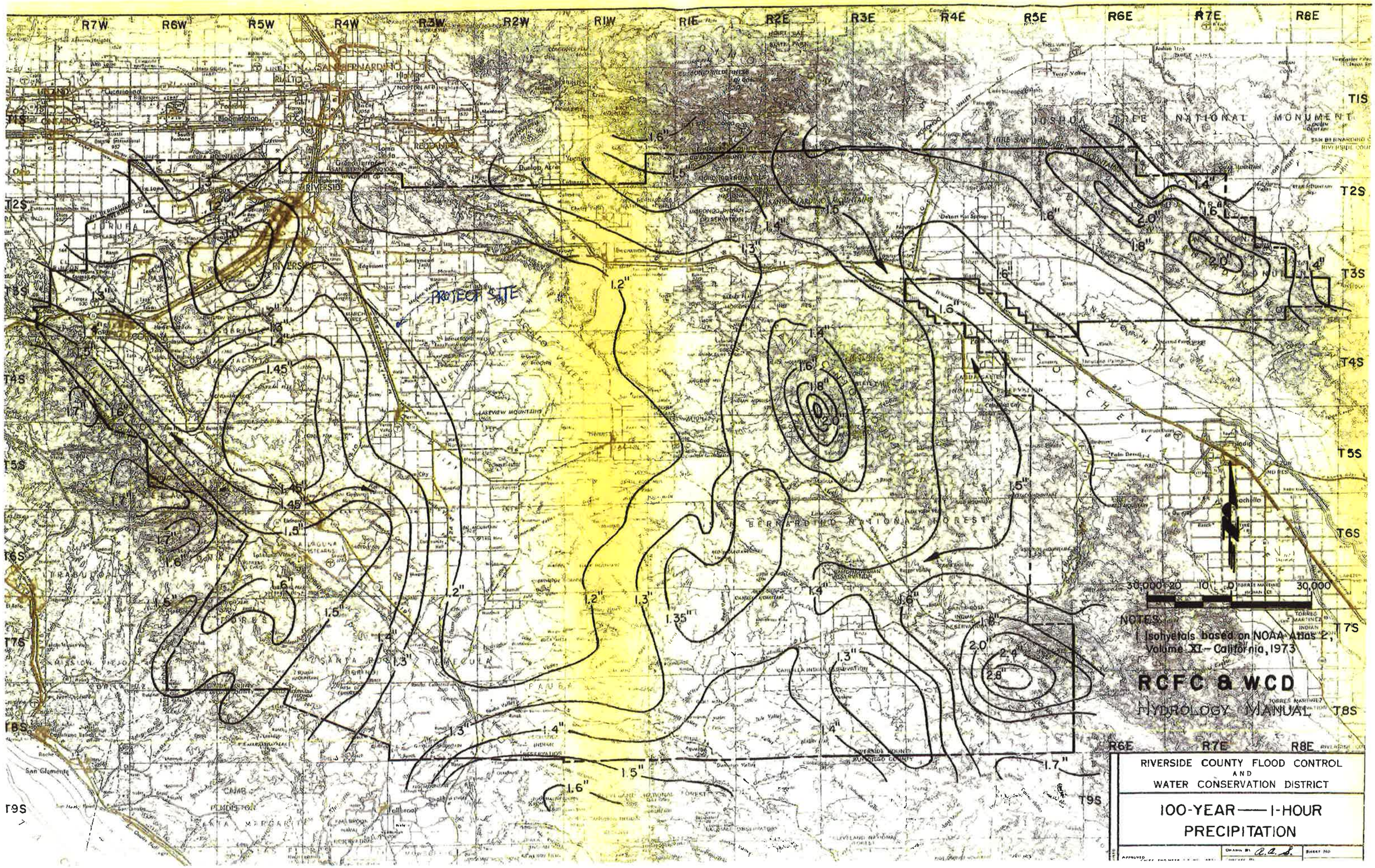
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S
SAN BERNARDINO
RIVERSIDE
JOSHUA TREE NATIONAL MONUMENT
PROJECT SITE
.50
.55
.45
.58
.60
.65
30,000 20 10 0 30,000
NOTES:
1. Slope of Intensity-Duration Curve based on District analysis of automatic recording rain gage records
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
SLOPE OF
INTENSITY DURATION
CURVE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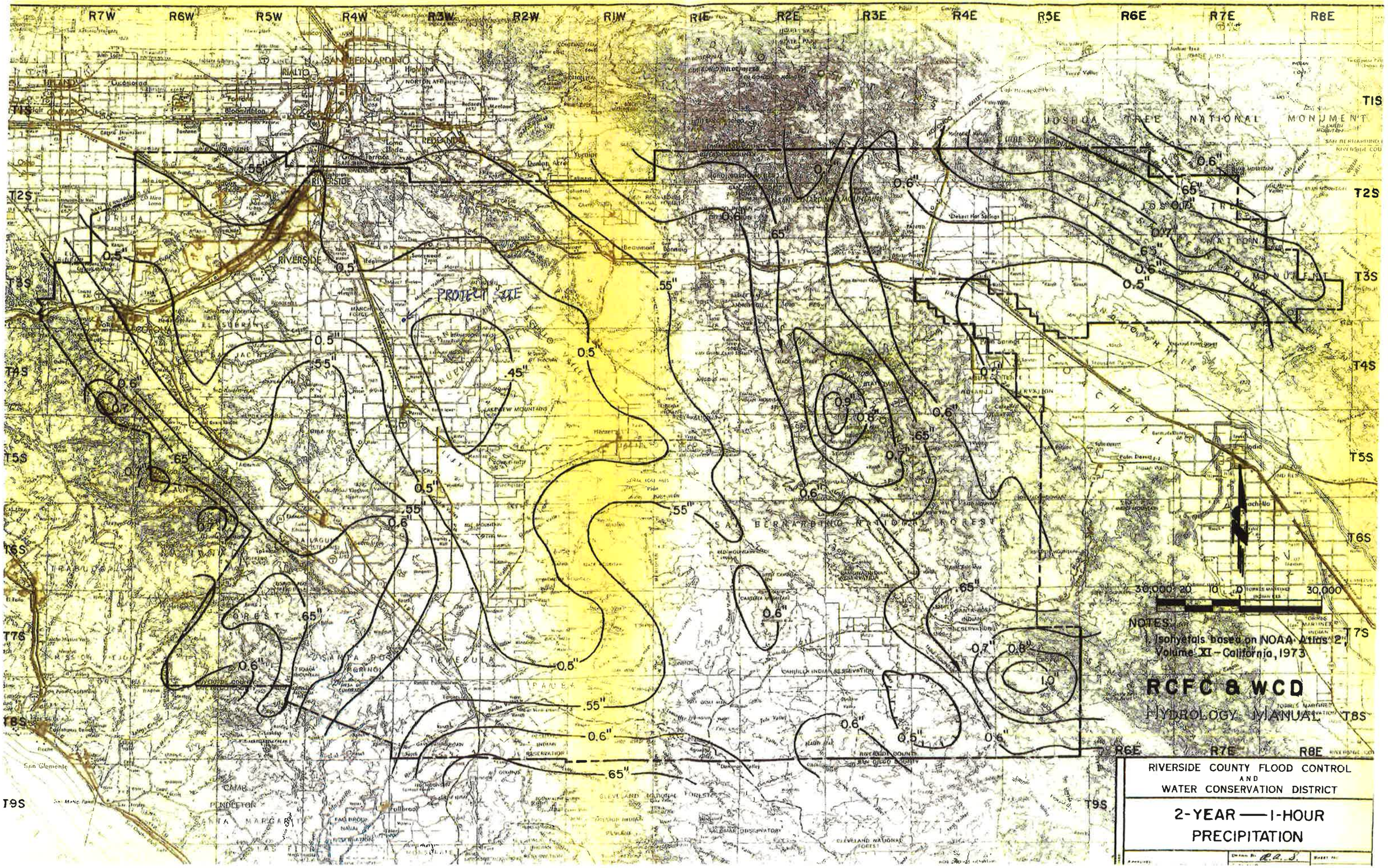
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S
SAN BERNARDINO
RIALTO
RIVERSIDE
JURUPA
JOSHUA TREE NATIONAL MONUMENT
BERNARDINO NATIONAL FOREST
PROJECT SITE
1.6"
1.5"
1.4"
1.3"
1.2"
1.45"
1.35"
1.7"
2.0"
1.8"
2.4"
2.8"
30,000 20 10 0 30,000
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR
PRECIPITATION
DRAWN BY
A.A.S.
SHEET NO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R6W
R5W
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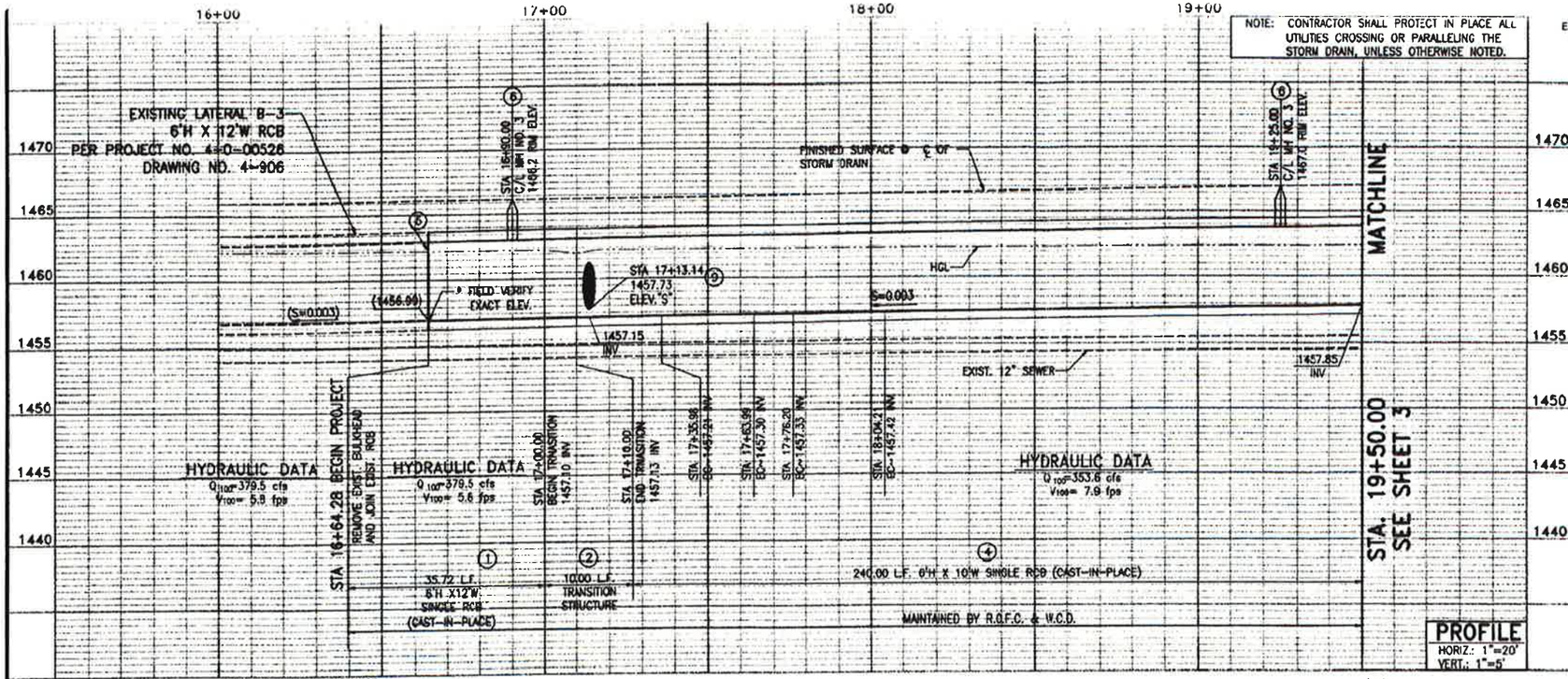
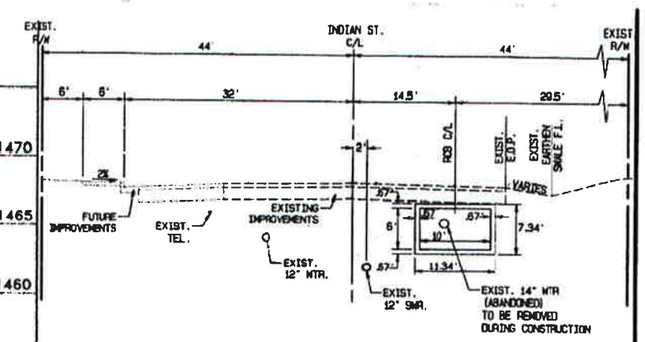
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S
SAN BERNARDINO
RIVERSIDE
PROJECT SITE
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO NATIONAL FOREST
30,000 20 10 0 30,000
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR
PRECIPITATION

Appendix E
Reference Plan –
Partial Perris Valley Master Drainage Plan DWG. 4-948



PROFILE

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



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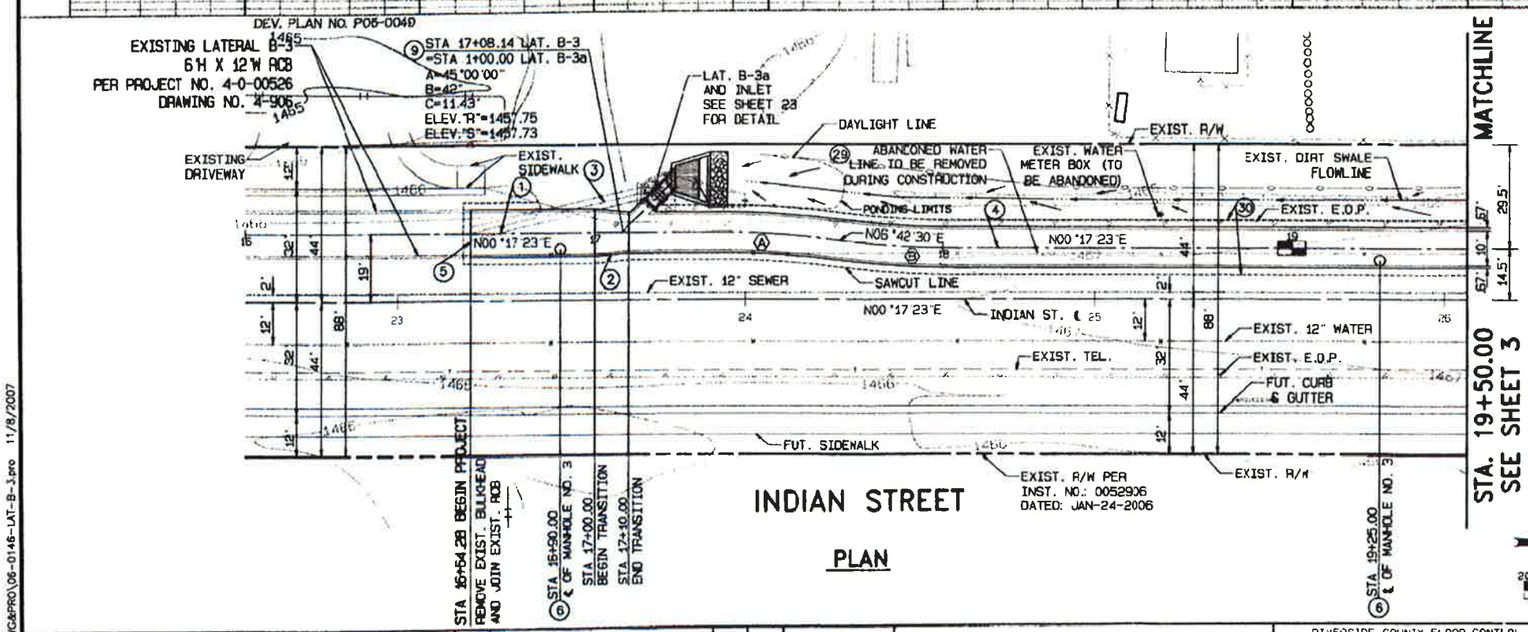
TYPICAL FROM STA. 18+04.21 TO STA. 19+50.00



INDIAN STREET

PLAN

CONSTRUCTION NOTES

1. CONSTRUCT 6'H x 12'W SINGLE CELL RCB (CAST-IN-PLACE) PER CALTRANS STD. NO. D80
2. CONSTRUCT TRANSITION STRUCTURE NO. 2 PER RCFC&WCD STD. NO. TS302
3. REMOVE EXISTING HEADWALL INLET STRUCTURE AND CMP
4. CONSTRUCT 6'H x 10'W SINGLE CELL RCB (CAST-IN-PLACE) PER CALTRANS STD. NO. D80
5. CONNECT TO EXISTING RCB PER CALTRANS STD. D-82
6. CONSTRUCT MANHOLE NO. 3 PER RCFC&WCD STD. DWG. MH253
9. CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFC&WCD STD. NO. JS226
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

Ⓐ ℄ CURVE DATA

Δ=06°25'08"
R=250.00'
L=28.01'
T=14.02'
BC=STA 17+35.98
EC=STA 17+63.99

Ⓑ ℄ CURVE DATA

Δ=06°25'08"
R=250.00'
L=28.01'
T=14.02'
BC=STA 17+76.20
EC=STA 18+04.21

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 INTERSECTON 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			
REV.	DESCRIPTION	APPR.	DATE

ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET, RIVERSIDE, CA. 92506
PH. (951) 686-1070 FAX (951) 788-1256
PREPARED BY: DATE: 13 MAY 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: DATE: 1-10-2008

CITY OF MORENO VALLEY APPROVALS
PARM KUMAR, ASSISTANT CITY ENGINEER R.C.E. C52463 (EXP. 12/31/08) DATE 12/12/07
CHRIS A. VOGT, CITY ENGINEER R.C.E. C44260 (EXP. 6/30/09) DATE 12/12/07

PERRIS VALLEY MASTER DRAINAGE PLAN
LATERAL B-3 STAGE-2
STA. 16+64.28 - STA. 19+50.00

PROJECT NO. 4-0-00526
DRAWING NO. 4-948
SHEET NO. 2 OF 28

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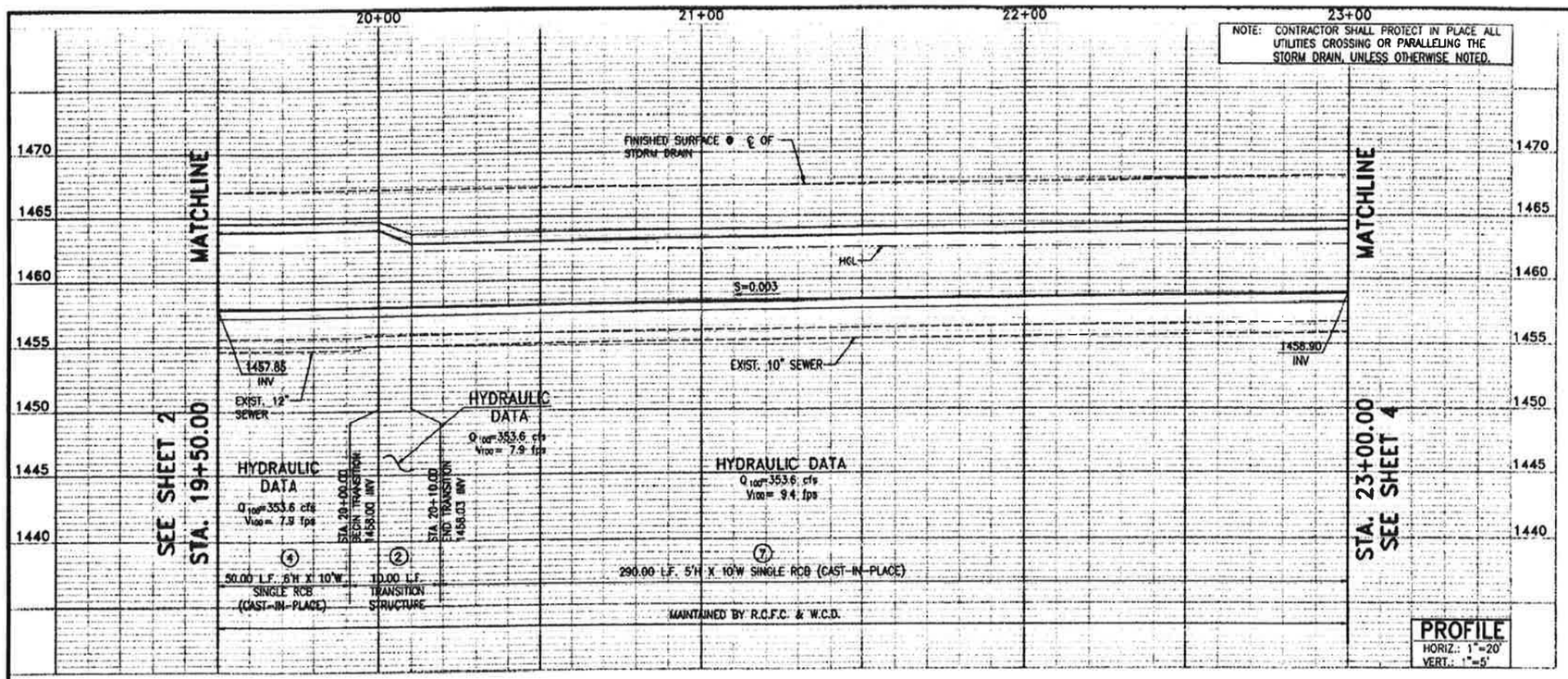
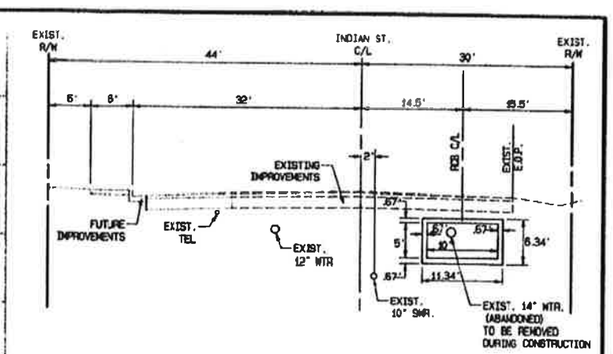
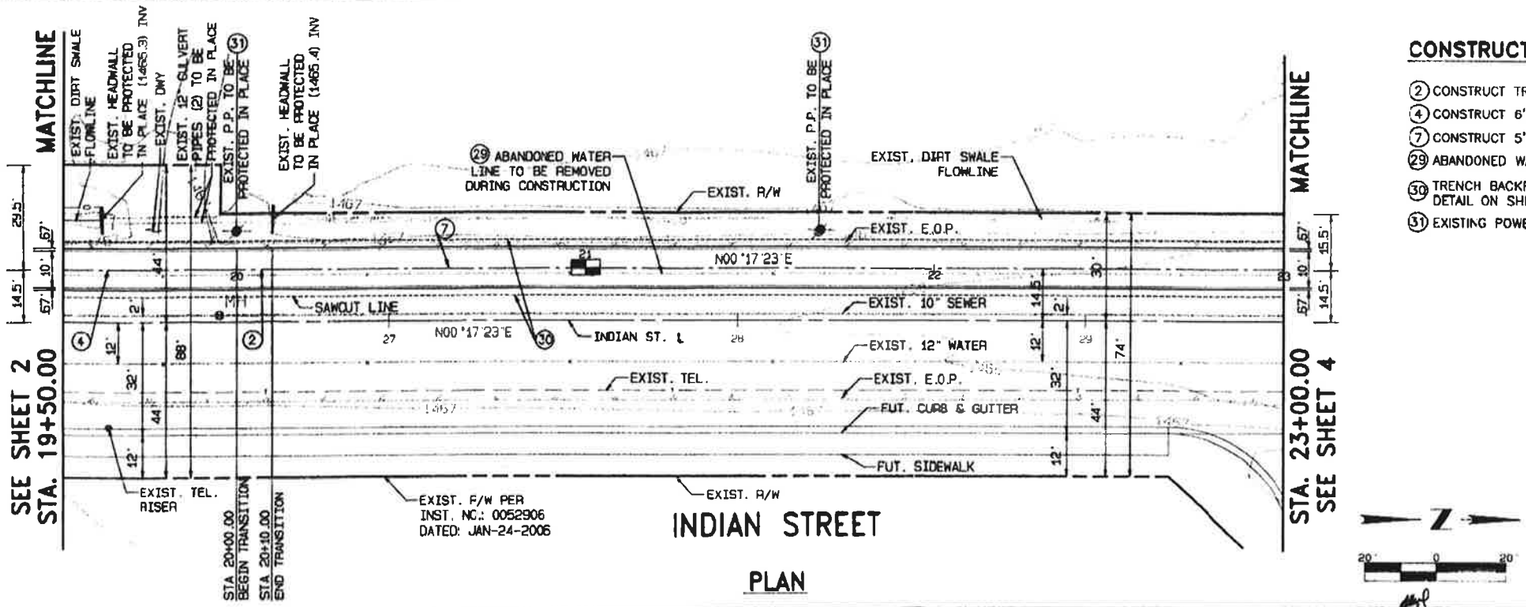




SECTION AT STA. 21+00.00

TYPICAL FROM STA. 19+50.00 TO STA. 23+00.00



PLAN

CONSTRUCTION NOTES

② CONSTRUCT TRANSITION STRUCTURE NO.2 PER RCFC&WCD STD. NO. TS302

④ CONSTRUCT 6'H x 10'W SINGLE CELL RCB (CAST-IN-PLACE) PER CALTRANS STD. NO. D80

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

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

Don't Dig...Until You Call U.S.A. Tol 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): 26.0 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 1983.

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: DATE: 9-30-08
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: DATE: 1-10-2008

CITY OF MORENO VALLEY APPROVALS

PREM KUMAR, ASSISTANT CITY ENGINEER R.C.E. C52453 (EXP. 12/31/08) DATE 12/12/07

CHRIS A. VOGT, CITY ENGINEER R.C.E. C44256 (EXP. 6/30/09) DATE 12/12/07

PERRIS VALLEY MASTER DRAINAGE PLAN
LATERAL B-3 STAGE-2
STA. 19+50.00 – STA. 23+00.00

PROJECT NO. 4-0-00526

DRAWING NO. 4-948

SHEET NO. 3 OF 28

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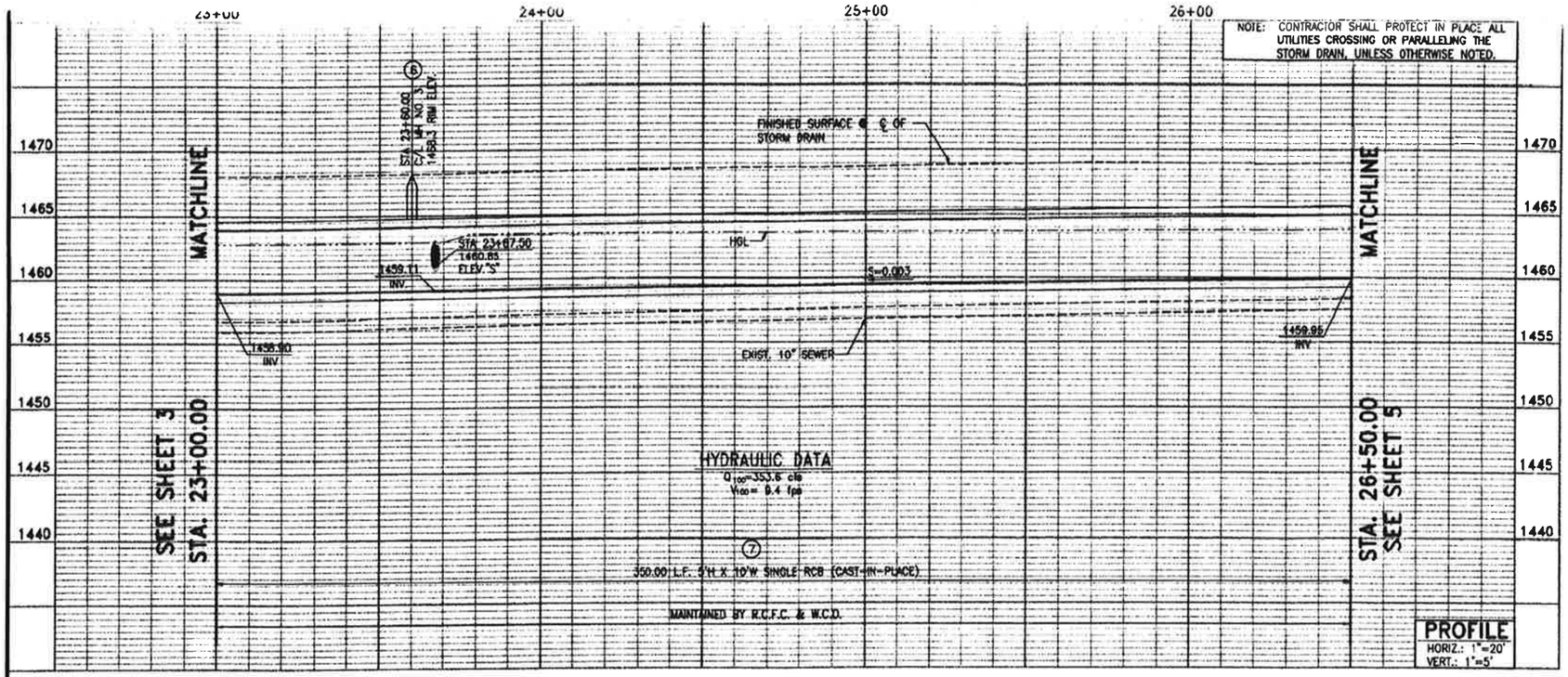
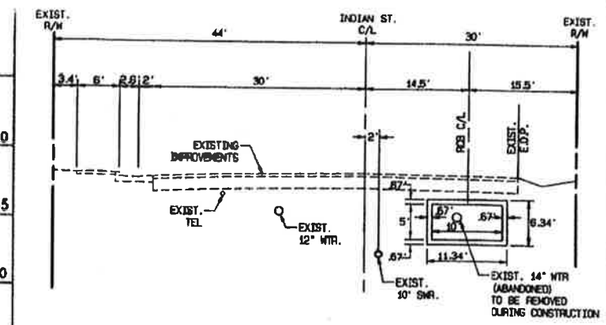


PROFILE

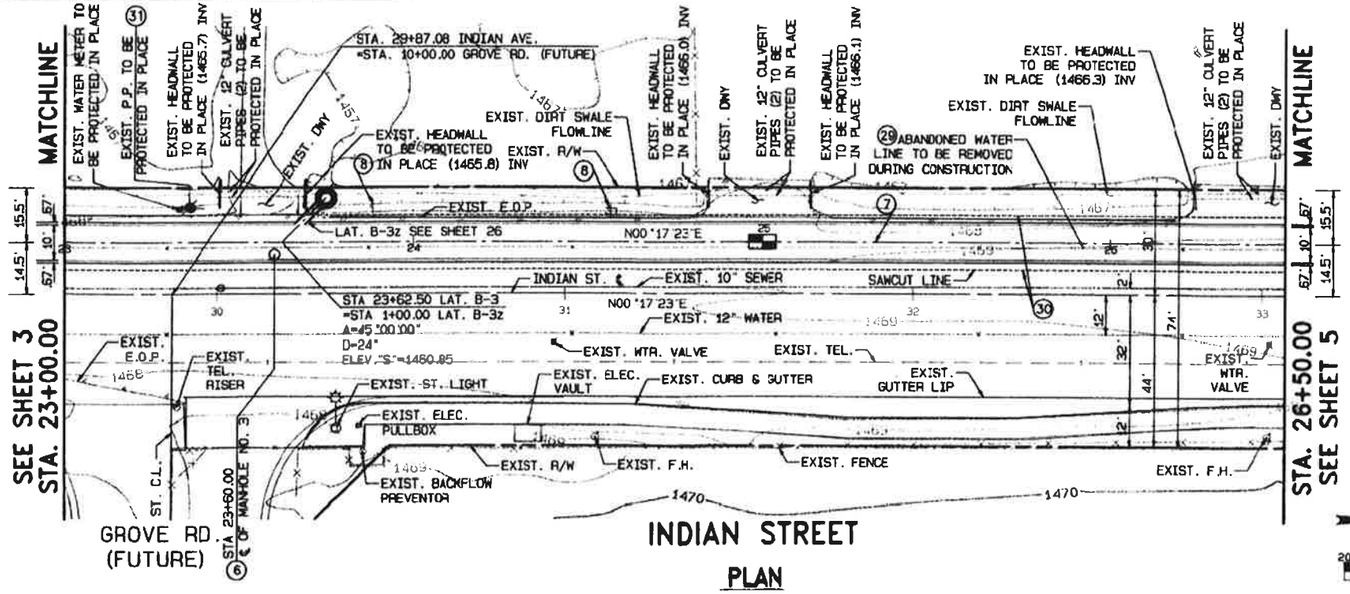
HORIZ.: 1"=20'
VERT.: 1"=5'



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

Z

20' 0 20'

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 #5300); 240 FEET WEST OF PERRIS BOULEVARD; 5.5 FEET SOUTH OF THE NORTHERLY END OF A 12 INCH x 48 FOOT CONCRETE HEADWALL. A BRASS DISH SET IN THE TOP OF A CONCRETE HEADWALL AND MARKED M-30 1993.

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: DATE: 12/14/07
R.C.E. NO. C67230 EXP. DATE 9-30-08
DESIGNED BY: JC
DRAWN BY: RR
CHECKED BY: JC

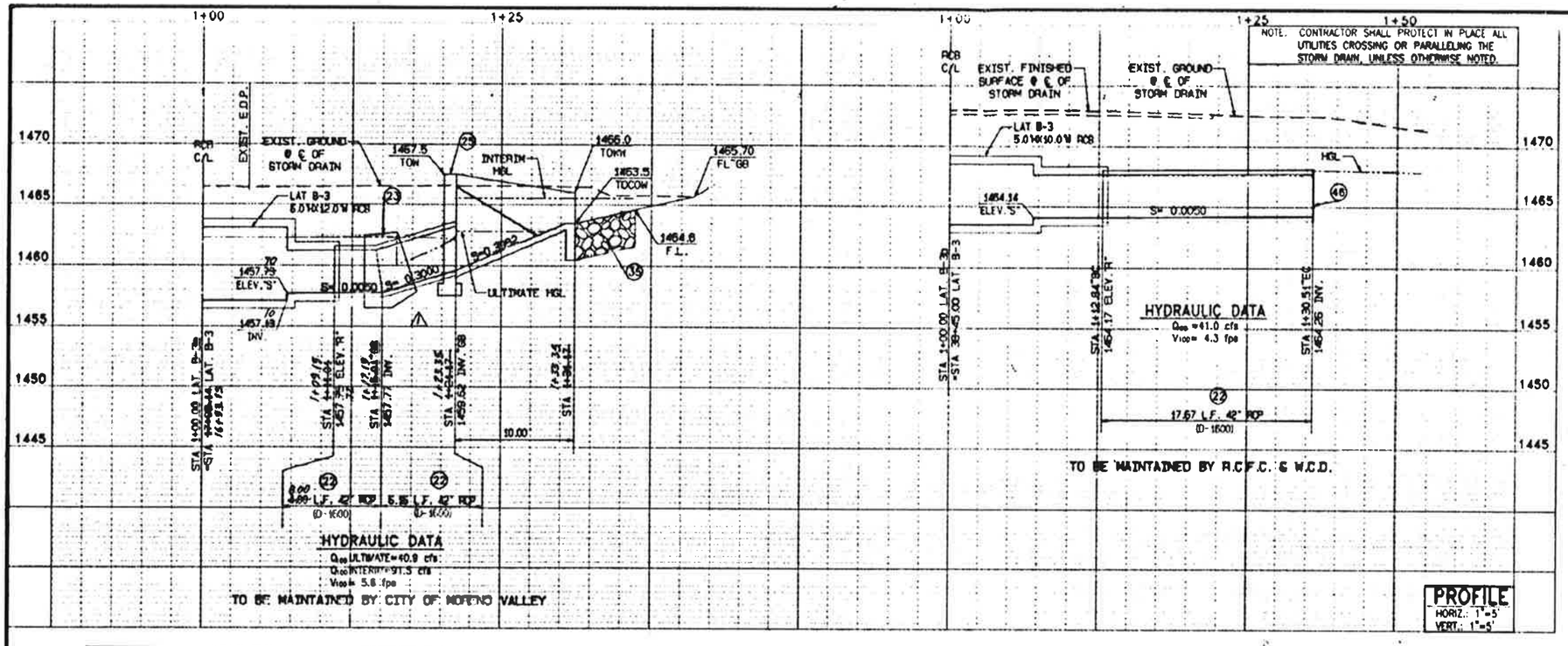
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED BY: DATE: 1/9/08
APPROVED BY: DATE: 1-10-2008

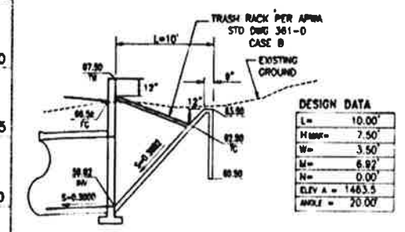
CITY OF MORENO VALLEY APPROVALS
PREM KUMAR, ASSISTANT CITY ENGINEER R.C.E. C38653 (EXP. 12/31/08) DATE 12/21/07
CHRIS A. VOGT, CITY ENGINEER R.C.E. C44250 (EXP. 6/30/09) DATE 12/21/07

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

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

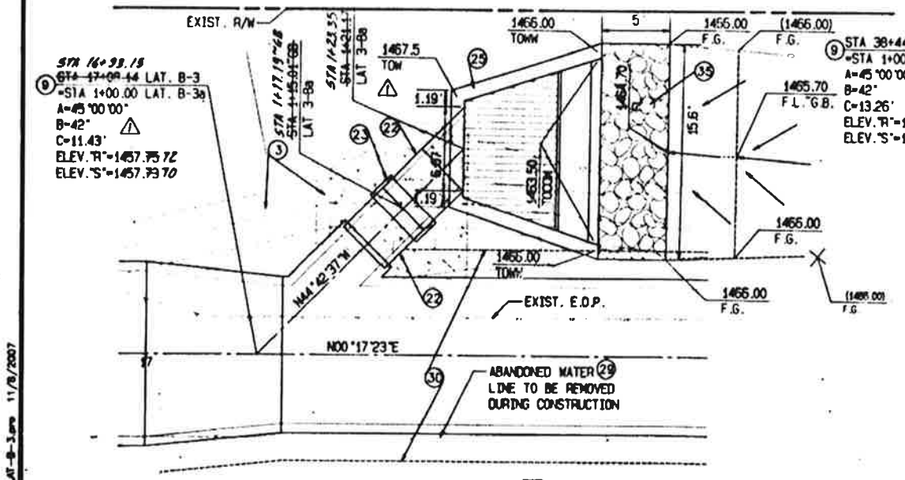




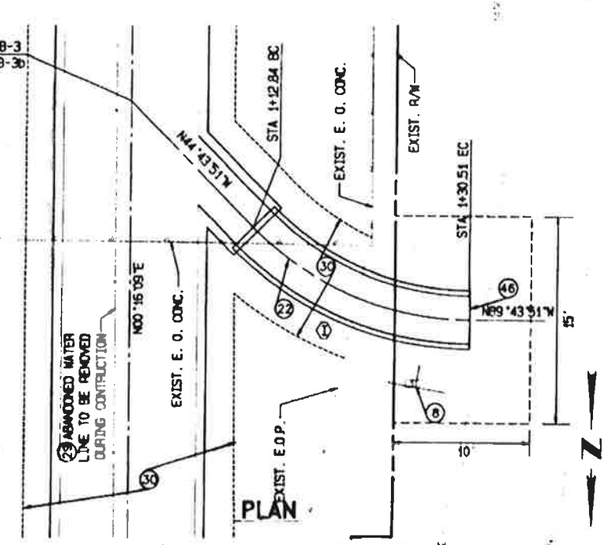
INLET HEADWALL W/TRASH RACK
CALTRANS STD 66B MODIFIED
(25) N.T.S.

MODIFY APRON LAYOUT AS SHOWN IN DETAIL. ALL STEEL REQUIREMENTS, CONCRETE TYPE, AND THICKNESS SHALL BE PER THE STANDARD.

LATERAL B-3a



LATERAL B-3a



LATERAL B-3b

(1) ℄ CURVE DATA
Δ=45°00'00"
R=22.50'
L=17.67'
T=9.32'
BC=STA 1+12.84
EC=STA 1+30.51

AS BUILT
APPROVED BY: [signature]
DATE 11-06-07

CONSTRUCTION NOTES

(3) REMOVE EXISTING HEADWALL INLET STRUCTURE AND CMP
(8) REMOVE AND REPLACE EXISTING SIGN
(9) CONSTRUCT JUNCTION STRUCTURE NO. 1 PER RCFC&WCD STD. NO. JS228
(22) INSTALL 42" RCP (D-LOAD PER PLAN)
(23) CONSTRUCT CONCRETE COLLAR PER RCFC&WCD STD. NO. M803
(24) INSTALL 42" CMP
(25) CONSTRUCT MODIFIED INLET PER DETAIL ON THIS SHEET
(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
(35) CONSTRUCT 5' x 15.6' X 3' DEEP LIGHT CLASS RIP-RAP WITH MIRAFI 1100N/15/300 FILTER FABRIC WITH 6" CLASS II BASE BELOW RIP RAP
(46) INSTALL CONCRETE BULKHEAD PER RCFC&WCD STD. DWG. M816

LATERAL B-3b

Don't Dig Until You Call U.S.A. Toll Free 1-800-227-2600 for the location of buried utility lines. Don't damage what you dig.

BENCH MARK: ELEVATION = 1484.22
COUNTY OF RIVERSIDE B.M. M-30 AT THE INTERSECTION OF PERRIS BOULEVARD AND GLENOAK DRIVE (PAVED) 24.0 FEET WEST OF PERRIS BOULEVARD, 8.8 FEET SOUTH OF THE NORTHERLY END OF A 12 INCH x 48 INCH CONCRETE HEADWALL. A BRASS DISK SET IN THE TOP OF A CONCRETE HEADWALL AND MARKED M-30 1963

REVISIONS		
REVISED RCB ALIGNMENT TO AVOID EX. P.P.		

ALBERT A. WEBB ASSOCIATES
3788 McCRAY STREET, RIVERSIDE, CA 92506
PH. (951) 686-1070 FAX (951) 788-1256
PREPARED BY: [signature] DATE 11/6/07
R.C.E. NO. 067290 EXP. DATE 6-30-08
DESIGNED BY: JK
DRAWN BY: RR
CHECKED BY: JK

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
RECOMMENDED BY: [signature] DATE 11/6/07
APPROVED BY: [signature] DATE 1-10-2008

CITY OF MORENO VALLEY APPROVALS
PREM KUMAR, ASSISTANT CITY ENGINEER R.C.E. 53483 EXP. 12/31/08 — DATE 12/6/07
CHRIS A. VOGT, CITY ENGINEER R.C.E. 44250 EXP. 6/30/08 — DATE 12/12/07

PERRIS VALLEY MASTER DRAINAGE PLAN
LATERAL B-3 STAGE-2
LATERAL B-3a AND LATERAL B-3b

PROJECT NO 4-0-00526
DRAWING NO 4-948
SHEET NO 23 OF 28

C:\2006\06-016\PERRIS\06-016-LAT-B-3.dwg 11/8/2007