HYDROLOGY AND HYDRAULIC ANALYSIS

FOR:

REDLANDS INDUSTRIAL FACILITY

NEC OF PLACENTIA AVE. & REDLANDS AVE.

PERRIS, CA 92571

CASE NUMBER: T.B.D.

TRUXAW PROJECT NUMBER: DED21077

PREPARED FOR:

Dedeaux Properties
100 Wilshire Blvd., Suite 250
Santa Monica, CA 90401

PREPARED BY:

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Civil Engineers & Land Surveyors
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Engineer: Craig Di Bias Registration No. 75205

PREPARED ON: DECEMBER 7, 2022

CONTENTS

APPENDICES

1.0 PURPOSE

This drainage study analyzes the existing and proposed hydrology characteristics for the Redlands Industrial Facility at the north east corner of Redlands Ave. & Placentia Ave. in the City of Perris, County of Riverside, at 33° 49' 24.57" N latitude and 117° 12' 58.63" W longitude.

2.0 SITE LOCATION

The subject site is bounded on the north by a residential property with a single mobile home, to the east by a dirt/shrub lot, to the south by Placentia Ave., and to the west by Redlands Ave. See the vicinity and location map included as Appendix A of this report.

The site is within the Santa Ana River Water Shed, sub-water shed is San Jacinto River. The site is underlain with Type B soil per the Riverside County Hydrology Manual included as Appendix B of this report.

2.1 WATERSHED DESCRIPTION

All hydrologic calculations are based on precipitation data and the slope of intensity duration curve from the Riverside County Hydrology Manual included as Appendix C of this report.

The site is within the Santa Ana River Water Shed, sub-water shed is San Jacinto River.

2.2 OFFSITE DRAINAGE

Per Riverside County Flood Control's (RCFC) Perris Valley Area Drainage map, the project site, plus its vicinity to the west, are tributary to the unconstructed Storm Drain Line H in Placentia Avenue. Tributary flows to Line H, from the project site plus westerly offsite areas, are approximately 632 cfs for a 10-year storm and 1,238 cfs for a 100-year storm. (See Appendix D for offsite hydrology calculations and Appendix G for offsite hydrology map)

On the north side of Placentia Avenue, west of Redlands Avenue, there is an existing City maintained detention basin accepting runoffs from an adjacent residential tract and discharging via an interim 36-inch storm drain flowing east in Placentia Avenue, then south in Redlands Avenue.

The portion of Line H fronting the project site – as double 10 ft by 7 ft reinforced concrete boxes – will be constructed as part of the site's offsite improvements. The double RC boxes will

be sloped at 0.2 percent, since the relatively flat topography from Redlands Avenue to the Perris Valley Channel does not allow for a steeper slope while still provide sufficient cover over the double boxes below Placentia Avenue street surface. During interim condition – before future extension of the double boxes further east from the project site – residual flows (138,301 cubic feet) inside the double RC boxes, 36-inch storm drain, and the city maintained detention basin after a storm event will be pumped up (at 1.6 cfs) and dispersed via a rip rap pad to a vegetated flow path north of the pavement edge, where tributary flows are conveyed under existing condition. See Appendix F for pipe hydraulic calculations, rip rap sizing calculations, residual flow volume and pump flow rate calculations.

Also, the existing 36-inch storm drain discharging from the City maintained detention basin is at a lower invert elevation (1428.91 per City of Perris benchmark datum, or 1431.14 per Riverside County benchmark datum) than the proposed double boxes (1430.33 and 1432.56) at the Placentia Avenue / Redlands Avenue intersection. A new 36-inch storm drain will be constructed from the intersection to the detention basin at 0.2 percent slope. The existing 36-inch pipe between the intersection and the detention basin will be abandoned in place.

See proposed Line H storm drain plans in Appendix H of this report.

2.3 EXISTING DRAINAGE

The existing site is a dirt/shrub lot and sheet flow from west to east. Stormwater ultimately flows to Placentia Avenue, which lead to the Perris Valley Storm Drain, then to San Jacinto River, then to Canyon Lake, and ultimately to Lake Elsinore. Existing condition runoffs from the site are approximately 3.76 cfs for a 10-year storm and 6.77 cfs for a 100-year storm.

See existing hydrology calculations in Appendix D and existing hydrology map in Appendix G.

2.4 PROPOSED DRAINAGE

The site discharges to on-site grated inlets, which lead to an underground infiltration system sized for the required post construction B.M.P. volume. The higher 10-year and 100-year flows will discharge southerly via a proposed 24-inch storm drain in the site's easterly parking lot and a parkway drain to Placentia Avenue, which leads to the Perris Valley Storm Drain, then to San Jacinto River, then to Canyon Lake, and ultimately to Lake Elsinore.

During interim condition, proposed site runoffs trapped at the bottom of the proposed storm drain system will be pumped up by the same proposed Line H sump pump and, likewise, dispersed via the same rip rap pad to the vegetated flow path on the north side of Placentia

Avenue. Under ultimate condition, all proposed 10-year and 100-year flows in the onsite storm drain will discharge to Line H.

Proposed condition runoffs from the site are approximately 7.64 cfs for a 10-year storm and 14.30 cfs for a 100-year storm. Of which, the Line H sump pump will convey 1.60 cfs, with the remainder (12.70 cfs) to discharge via the proposed parkway drain to the same rip rap pad.

See proposed hydrology calculations in Appendix D and hydrology map in Appendix G.

3.0 METHODOLOGY

For this study, all drainage runoffs have been calculated for the 10-year and 100-year storm event for. All flow rate calculations are done using the Rational Method Hydrology Computer Program Package designed by Advanced Engineering Software (AES). Calculations are included as Appendix D in this report. Pipe hydraulics and parkway drain sizing calculations are done using Hydraulic Elements I (HELE 1), also designed by AES.

4.0 SUMMARY

The site design ensures that Stormwater runoff will not adversely affect the site's operation and ensure that danger to property and life is minimal. Hydrology maps summarizing these calculations are included in Appendix F of this report.

4.1 10-YEAR AND 100-YEAR STORM EVENT

The proposed flows have been calculated for the 10-year and 100-year and are shown in the table below. The AES files are provided in Appendix D.

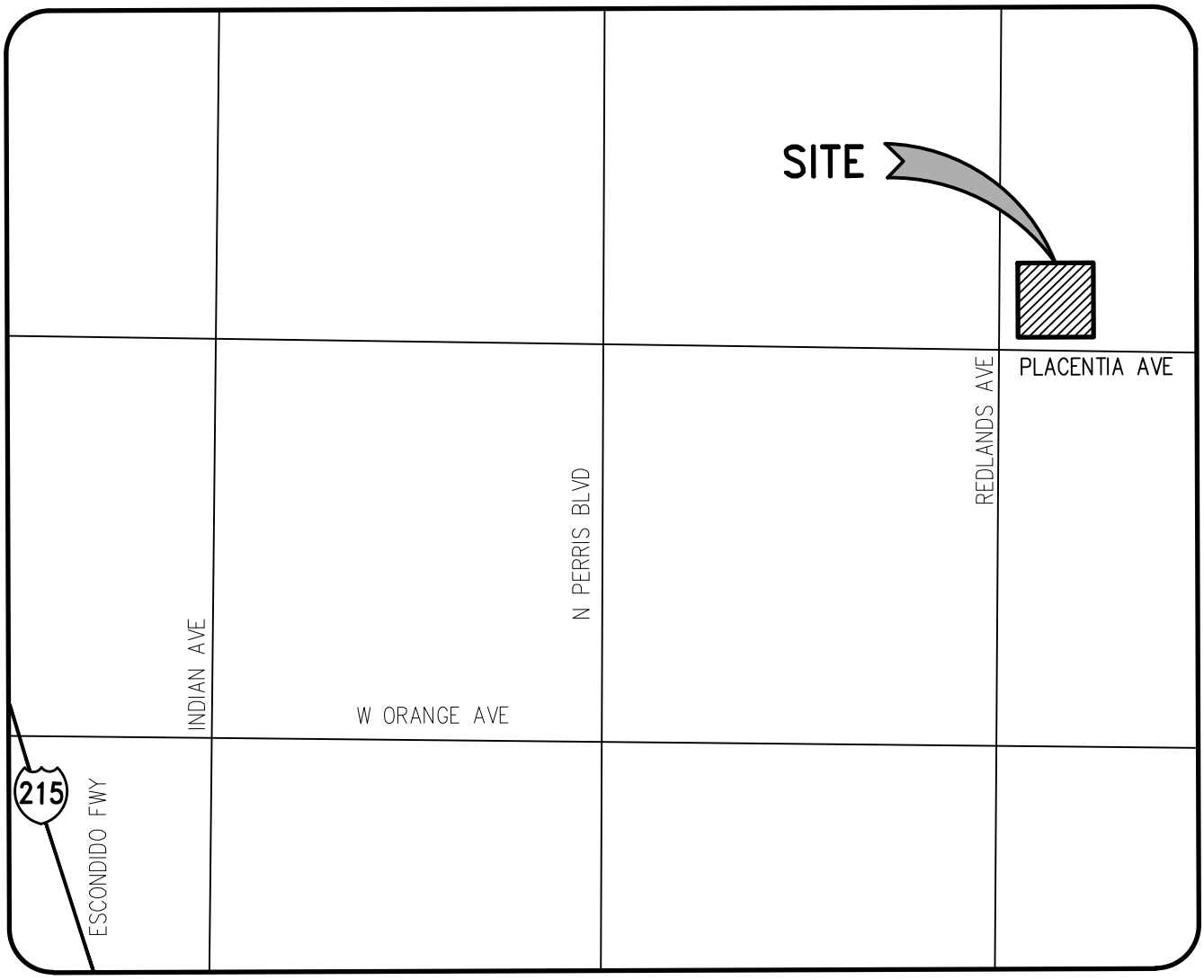
The difference between the existing and proposed flows are shown in the table below.

STORM EVENT	Offsite Flow (cfs)	Existing Flow (cfs)	Proposed Flow (cfs)	Increased Flow (cfs)
10	632	3.76	9.19	5.43
100	1,238	6.77	14.30	7.53

4.2 BUILDING PROTECTION AND OVERFLOW

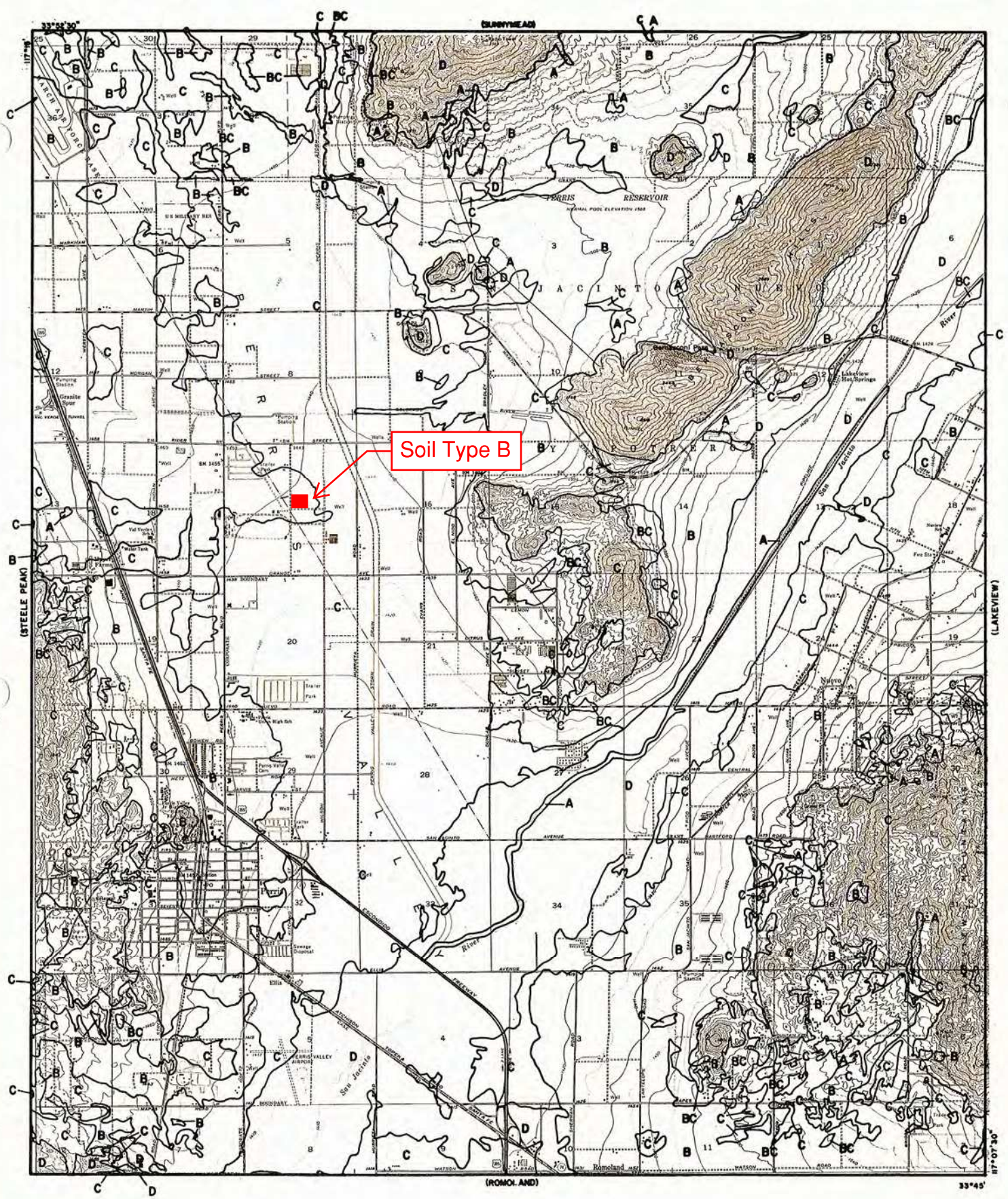
During larger storm events, runoffs from the site will overflow the Catch Basin located near the southeast driveway and will flow out to Placentia Avenue via the parkway drain at the site's southeast corner. The lowest point of the building finished floor elevation has been set at 1443.9 with the southern inlet surface elevation of 1439.7, therefore stormwater will discharge offsite before entering the building.

APPENDIX A –VICINITY MAP



VICINITY MAP
NOT TO SCALE

APPENDIX B – RCFC HYDROLOGIC SOILS GROUP MAP



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

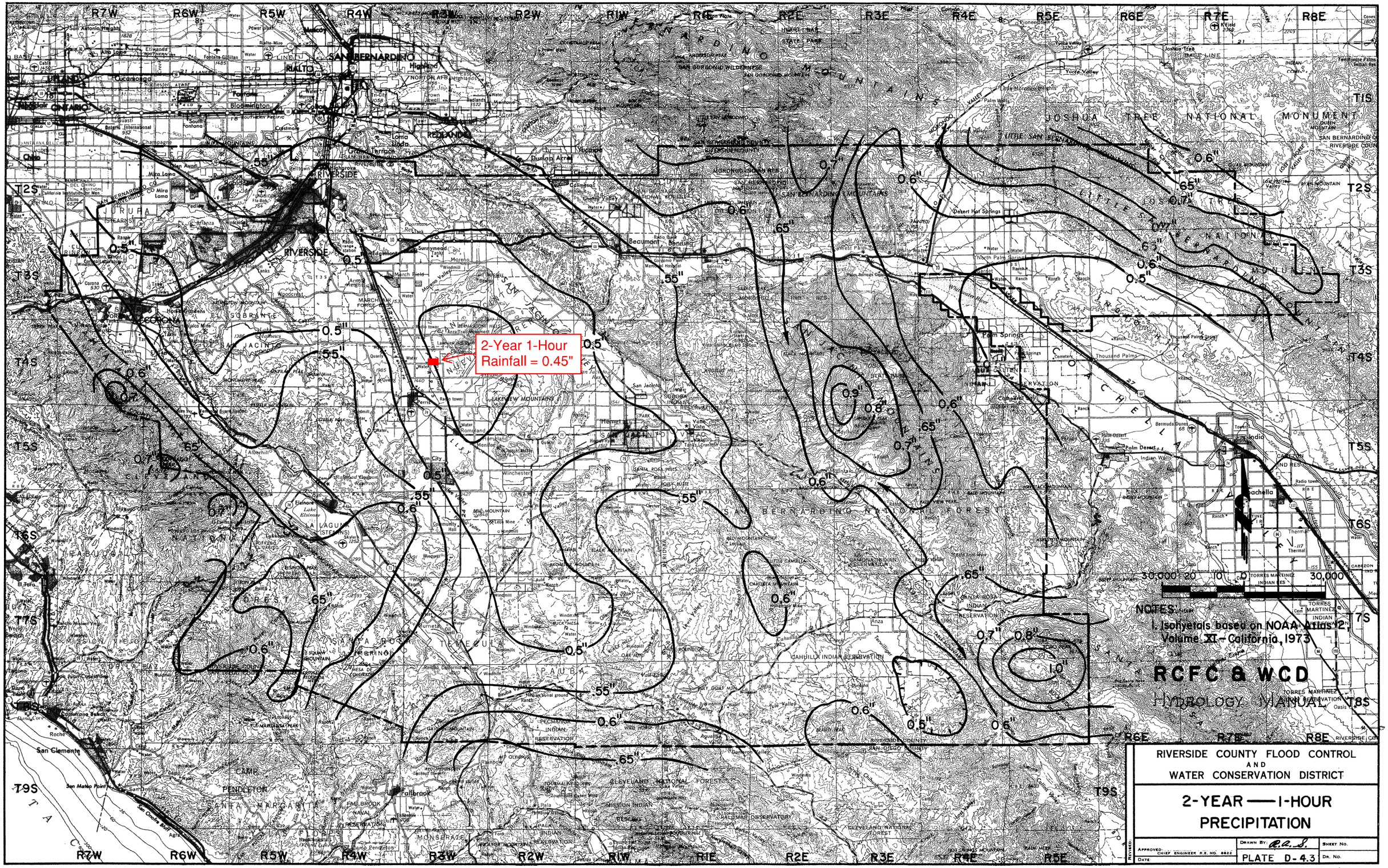
N

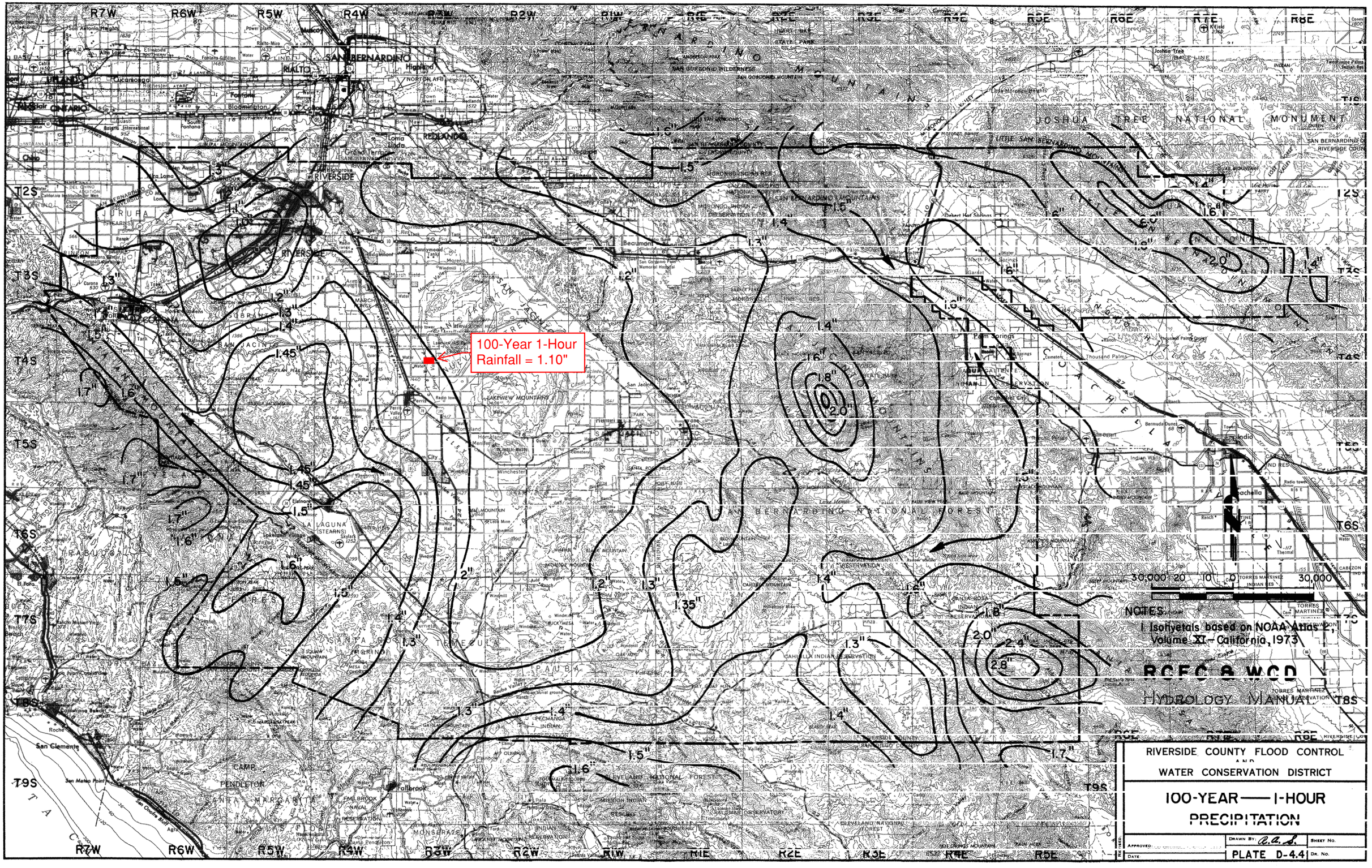
0 FEET 5000

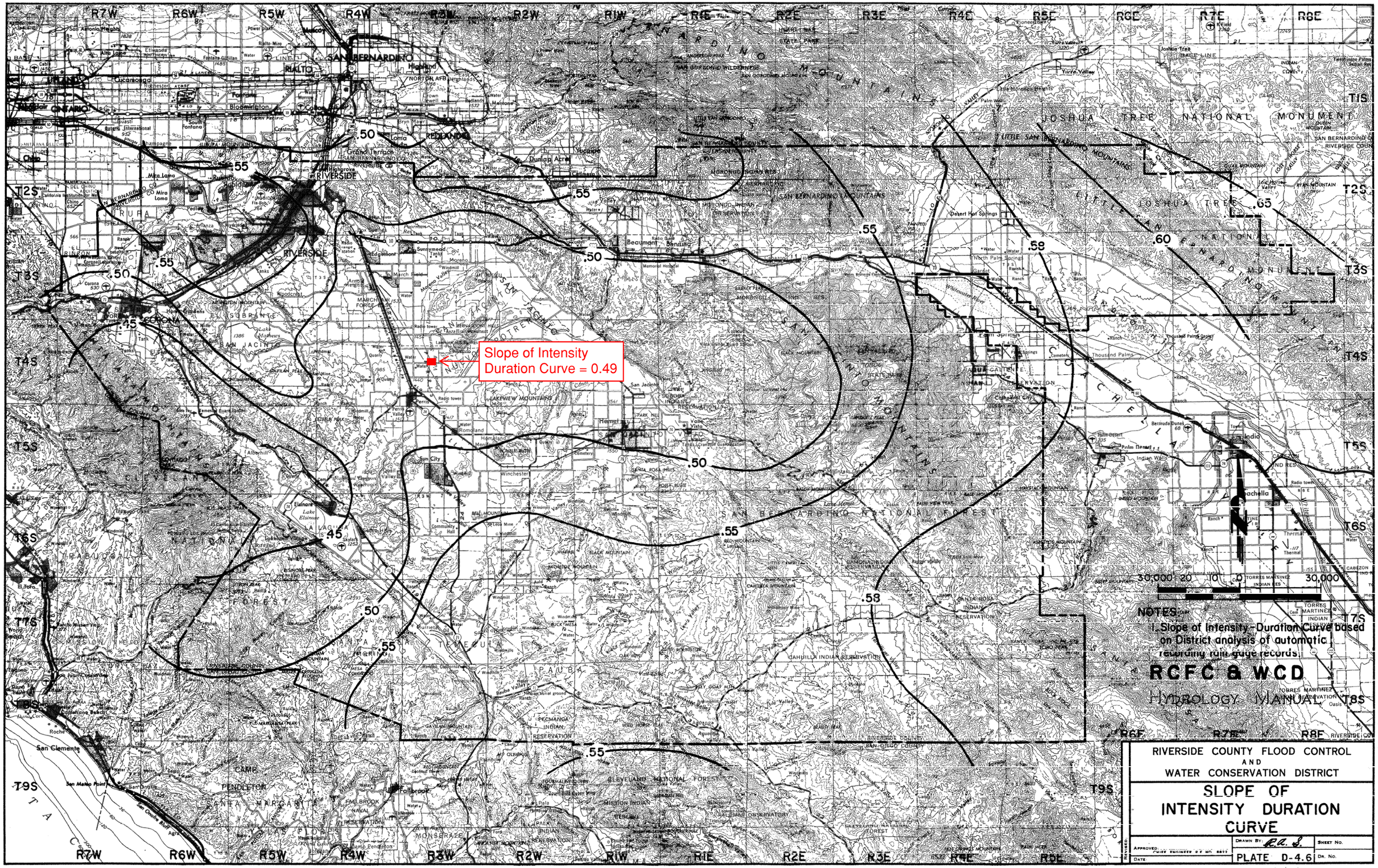
HYDROLOGIC SOILS GROUP MAP FOR PERRIS

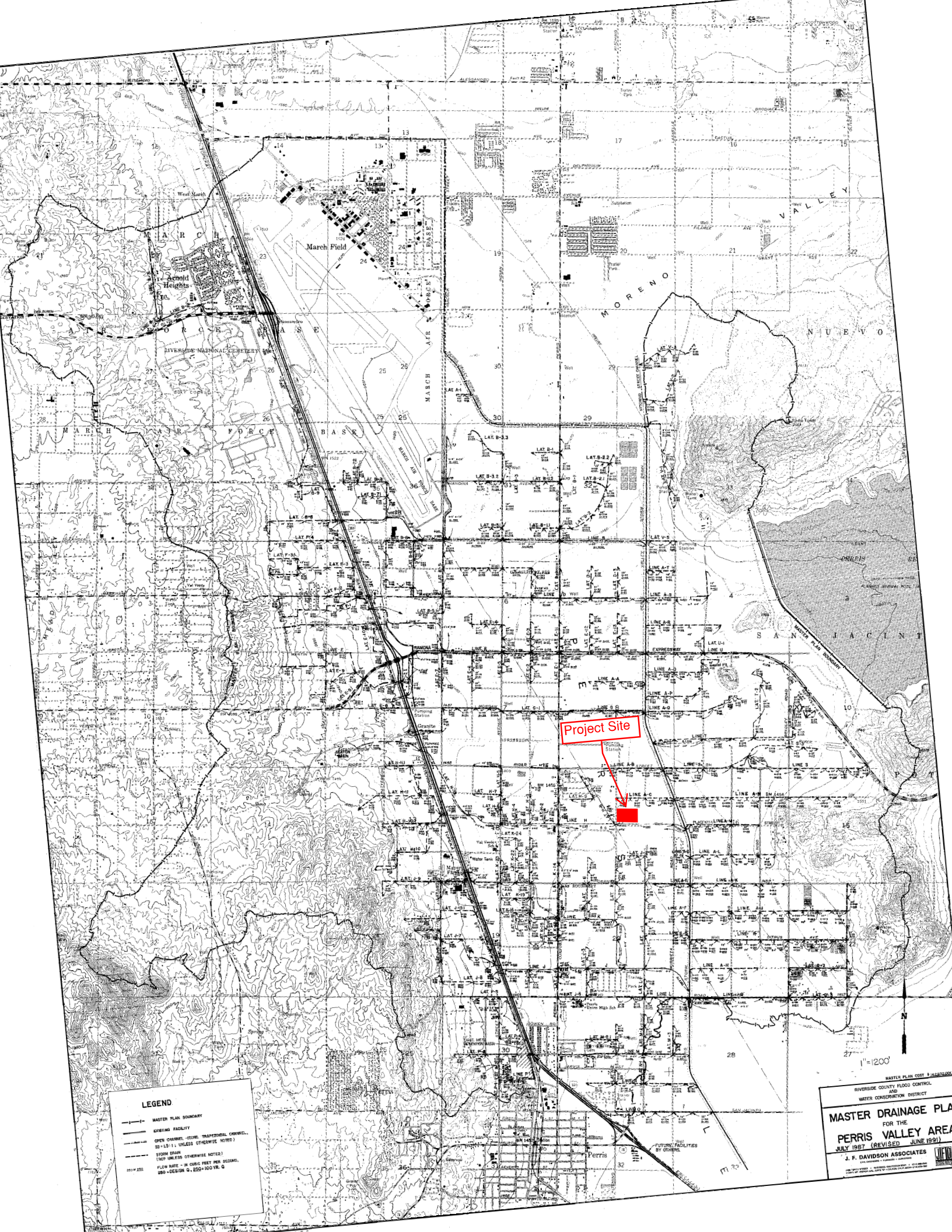
PLATE C-1.30

APPENDIX C – RCFC RAINFALL DEPTH AND INTENSITY


2-Year 1-Hour
Rainfall = 0.45"
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
DRAWN BY: R.A.S.
PLATE D-4.3
SHEET NO.
DR. NO.
APPROVED CHIEF ENGINEER R.E. NO. 6822
DATE
REVISED:


100-Year 1-Hour
Rainfall = 1.10"
SAN BERNARDINO
RIVERSIDE
RIALTO
ONTARIO
CORONA
NORCO
JURUPA
PEDLEY
RUBIDOUX
MISSION
SANTA ROSA
TEMECULA
PAUBA
LAGUNA (STEARNS)
PECHANGA INDIAN RESERVATION
SANTA ROSA INDIAN RESERVATION
AGUANGA INDIAN RESERVATION
CAHUILLA INDIAN RESERVATION
SAN JACINTO MOUNTAINS
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
JOSHUA TREE NATIONAL MONUMENT
CAMP PENDLETON
SANTA MARGARITA
LAS FLORES
MARCH AFB
NORTON AFB
Palm Springs
Indio
Coachella
Temecula
Fallbrook
San Clemente
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
1.1"
1.2"
1.3"
1.4"
1.5"
1.6"
1.7"
1.8"
2.0"
2.4"
2.8"
1.45"
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
APPROVED:
DATE
DRAWN BY: A.A.S.
SHEET NO.
PLATE D-4.4
DR. NO.


Slope of Intensity
Duration Curve = 0.49
.45
.50
.55
.58
.59
.60
.63
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
PLATE D-4.6


Project Site
LEGEND
MASTER PLAN BOUNDARY
EXISTING FACILITY
OPEN CHANNEL (CONC. TRAPEZOIDAL CHANNEL, SS = LS : 1 , UNLESS OTHERWISE NOTED)
STORM DRAIN (RCP UNLESS OTHERWISE NOTED)
FLOW RATE - IN CUBIC FEET PER SECOND, 250 = DESIGN Q, 250 = 100 YR. Q
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
MASTER DRAINAGE PLA
FOR THE
PERRIS VALLEY AREA
JULY 1987 (REVISED JUNE 1991)
J. F. DAVIDSON ASSOCIATES
1"=1200'
N
March Field
Arnold Heights
Perris
Granite Hill
MARCH AIR FORCE BASE
MORENO VALLEY
NUEVO
SAN JACINTO

APPENDIX D – ADVANCED ENGINEERING SOFTWARE (AES) RESULTS

OFFSITE 10-YEAR

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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 1982-2016 Advanced Engineering Software (aes)
                  (Rational Tabling Version 23.0)
               Release Date: 07/01/2016  License ID 1537

                      Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS                          *
* OFFSITE 10-YEAR                                                        *
*                                                                        *
 ************************************************************************

  FILE NAME: X:\AES\21077\OFF10.DAT
  TIME/DATE OF STUDY: 13:06 11/14/2022
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.840
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.796
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.220
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.400
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4676529
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4648553
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.804
  SLOPE OF INTENSITY DURATION CURVE = 0.4677
  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    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(FEET) =  3150.00
  UPSTREAM ELEVATION(FEET) =   1910.00
  DOWNSTREAM ELEVATION(FEET) =   1720.00
  ELEVATION DIFFERENCE(FEET) =    190.00
  TC = 0.533*[( 3150.00**3)/(   190.00)]**.2 =   23.423
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.248
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4893
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =     57.11
  TOTAL AREA(ACRES) =     93.50   TOTAL RUNOFF(CFS) =     57.11

****************************************************************************
  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) =   1720.00  DOWNSTREAM(FEET) =   1550.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  3710.00   CHANNEL SLOPE =  0.0458
 CHANNEL FLOW THRU SUBAREA(CFS) =      57.11
 FLOW VELOCITY(FEET/SEC) =   8.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   7.18   Tc(MIN.) =   30.60
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    6860.00 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) =  1.101
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4613
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   99.90   SUBAREA RUNOFF(CFS) =   50.76
 TOTAL AREA(ACRES) =      193.4   TOTAL RUNOFF(CFS) =     107.86
 TC(MIN.) =   30.60

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1550.00  DOWNSTREAM(FEET) =   1510.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1450.00   CHANNEL SLOPE =  0.0276
 CHANNEL FLOW THRU SUBAREA(CFS) =     107.86
 FLOW VELOCITY(FEET/SEC) =   8.07 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.00   Tc(MIN.) =   33.60
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    8310.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.054
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4514
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   98.80   SUBAREA RUNOFF(CFS) =   47.03
 TOTAL AREA(ACRES) =      292.2   TOTAL RUNOFF(CFS) =     154.89
 TC(MIN.) =   33.60

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
 UPSTREAM ELEVATION(FEET) = 1510.00  DOWNSTREAM ELEVATION(FEET) = 1500.00
 STREET LENGTH(FEET) =  1870.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =     196.04
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  1.03
  HALFSTREET FLOOD WIDTH(FEET) =   48.09
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.58
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.71
 STREET FLOW TRAVEL TIME(MIN.) =   6.81   Tc(MIN.) =   40.41
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.967
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8532
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   99.90      SUBAREA RUNOFF(CFS) =   82.44
```

```
 TOTAL AREA(ACRES) =      392.1       PEAK FLOW RATE(CFS) =     237.33

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.09   HALFSTREET FLOOD WIDTH(FEET) =  51.39
 FLOW VELOCITY(FEET/SEC.) =  4.81   DEPTH*VELOCITY(FT*FT/SEC.) =   5.26
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 1870.0 FT WITH ELEVATION-DROP =  10.0 FT, IS  123.0 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    104.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =   10180.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1500.00  DOWNSTREAM ELEVATION(FEET) = 1475.00
 STREET LENGTH(FEET) =  1670.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =     275.93
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.97
  HALFSTREET FLOOD WIDTH(FEET) =   45.35
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.32
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    7.13
 STREET FLOW TRAVEL TIME(MIN.) =   3.80   Tc(MIN.) =   44.21
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.927
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8523
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   97.70     SUBAREA RUNOFF(CFS) =   77.22
 TOTAL AREA(ACRES) =      489.8       PEAK FLOW RATE(CFS) =     314.55

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.01   HALFSTREET FLOOD WIDTH(FEET) =  47.36
 FLOW VELOCITY(FEET/SEC.) =  7.59   DEPTH*VELOCITY(FT*FT/SEC.) =   7.70
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 1670.0 FT WITH ELEVATION-DROP =  25.0 FT, IS  135.6 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    105.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =   11850.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1475.00  DOWNSTREAM ELEVATION(FEET) = 1460.00
 STREET LENGTH(FEET) =  1490.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =     352.50
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  1.12
  HALFSTREET FLOOD WIDTH(FEET) =   52.85
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.72
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    7.55
 STREET FLOW TRAVEL TIME(MIN.) =   3.69   Tc(MIN.) =   47.90
```

```
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.893
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8514
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   99.80     SUBAREA RUNOFF(CFS) =   75.90
 TOTAL AREA(ACRES) =      589.6      PEAK FLOW RATE(CFS) =     390.45

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.16   HALFSTREET FLOOD WIDTH(FEET) =  54.81
 FLOW VELOCITY(FEET/SEC.) =  6.89   DEPTH*VELOCITY(FT*FT/SEC.) =   8.02
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 1490.0 FT WITH ELEVATION-DROP =  15.0 FT, IS  136.3 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    106.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =   13340.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1460.00  DOWNSTREAM ELEVATION(FEET) = 1455.00
 STREET LENGTH(FEET) =  1250.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =     426.92
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  1.41
  HALFSTREET FLOOD WIDTH(FEET) =   67.08
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.93
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    6.95
 STREET FLOW TRAVEL TIME(MIN.) =   4.22   Tc(MIN.) =   52.13
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.859
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8505
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   99.90     SUBAREA RUNOFF(CFS) =   72.96
 TOTAL AREA(ACRES) =      689.5      PEAK FLOW RATE(CFS) =     463.40

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.45   HALFSTREET FLOOD WIDTH(FEET) =  69.15
 FLOW VELOCITY(FEET/SEC.) =  5.03   DEPTH*VELOCITY(FT*FT/SEC.) =   7.29
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 1250.0 FT WITH ELEVATION-DROP =   5.0 FT, IS  129.2 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    107.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =   14590.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1455.00  DOWNSTREAM ELEVATION(FEET) = 1450.00
 STREET LENGTH(FEET) =  1530.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =     495.34
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  1.54
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  HALFSTREET FLOOD WIDTH(FEET) =   73.67
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.71
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    7.26
 STREET FLOW TRAVEL TIME(MIN.) =   5.41   Tc(MIN.) =   57.54
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.820
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8495
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   91.70     SUBAREA RUNOFF(CFS) =   63.87
 TOTAL AREA(ACRES) =      781.2      PEAK FLOW RATE(CFS) =     527.27

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.58   HALFSTREET FLOOD WIDTH(FEET) =  75.44
 FLOW VELOCITY(FEET/SEC.) =  4.78   DEPTH*VELOCITY(FT*FT/SEC.) =   7.53
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 1530.0 FT WITH ELEVATION-DROP =   5.0 FT, IS  111.9 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    108.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =   16120.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1449.00  DOWNSTREAM ELEVATION(FEET) = 1441.00
 STREET LENGTH(FEET) =  2460.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =     551.84
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  1.60
  HALFSTREET FLOOD WIDTH(FEET) =   76.84
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.81
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    7.72
 STREET FLOW TRAVEL TIME(MIN.) =   8.52   Tc(MIN.) =   66.06
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.769
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .6404
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   99.80     SUBAREA RUNOFF(CFS) =   49.13
 TOTAL AREA(ACRES) =      881.0      PEAK FLOW RATE(CFS) =     576.40

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.63   HALFSTREET FLOOD WIDTH(FEET) =  78.12
 FLOW VELOCITY(FEET/SEC.) =  4.86   DEPTH*VELOCITY(FT*FT/SEC.) =   7.92
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 2460.0 FT WITH ELEVATION-DROP =   8.0 FT, IS   78.5 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    109.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =   18580.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1441.00  DOWNSTREAM ELEVATION(FEET) = 1433.00
 STREET LENGTH(FEET) =  3090.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =     604.32
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  1.73
  HALFSTREET FLOOD WIDTH(FEET) =   83.13
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.48
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    7.75
 STREET FLOW TRAVEL TIME(MIN.) =  11.48   Tc(MIN.) =   77.54
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  0.713
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8465
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   92.50      SUBAREA RUNOFF(CFS) =   55.83
 TOTAL AREA(ACRES) =      973.5       PEAK FLOW RATE(CFS) =     632.23

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.76   HALFSTREET FLOOD WIDTH(FEET) =  84.59
 FLOW VELOCITY(FEET/SEC.) =  4.53   DEPTH*VELOCITY(FT*FT/SEC.) =   7.96
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 3090.0 FT WITH ELEVATION-DROP =   8.0 FT, IS   96.4 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    110.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =   21670.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      973.5  TC(MIN.) =     77.54
 PEAK FLOW RATE(CFS)   =     632.23
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

OFFSITE 100-YEAR

```
------------------------------------------------------------------------------
******************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                  (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                  (Rational Tabling Version 23.0)
               Release Date: 07/01/2016  License ID 1537

                      Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS                          *
* OFFSITE 100-YEAR                                                       *
*                                                                        *
 ************************************************************************

  FILE NAME: X:\AES\21077\OFF100.DAT
  TIME/DATE OF STUDY: 11:38 11/14/2022
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  1.840
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.796
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.220
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.400
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4676529
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4648553
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.400
  SLOPE OF INTENSITY DURATION CURVE = 0.4649
  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    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(FEET) =  3150.00
  UPSTREAM ELEVATION(FEET) =   1910.00
  DOWNSTREAM ELEVATION(FEET) =   1720.00
  ELEVATION DIFFERENCE(FEET) =    190.00
  TC = 0.533*[( 3150.00**3)/(   190.00)]**.2 =   23.423
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.168
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6068
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =    122.99
  TOTAL AREA(ACRES) =     93.50   TOTAL RUNOFF(CFS) =    122.99

****************************************************************************
  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) =   1720.00  DOWNSTREAM(FEET) =   1550.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  3710.00   CHANNEL SLOPE =  0.0458
 CHANNEL FLOW THRU SUBAREA(CFS) =     122.99
 FLOW VELOCITY(FEET/SEC) =  10.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   5.72   Tc(MIN.) =   29.14
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    6860.00 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) =  1.959
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5864
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   99.90   SUBAREA RUNOFF(CFS) =  114.73
 TOTAL AREA(ACRES) =      193.4   TOTAL RUNOFF(CFS) =     237.72
 TC(MIN.) =   29.14

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1550.00  DOWNSTREAM(FEET) =   1510.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1450.00   CHANNEL SLOPE =  0.0276
 CHANNEL FLOW THRU SUBAREA(CFS) =     237.72
 FLOW VELOCITY(FEET/SEC) =  10.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.35   Tc(MIN.) =   31.49
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    8310.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.889
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5789
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   98.80   SUBAREA RUNOFF(CFS) =  108.06
 TOTAL AREA(ACRES) =      292.2   TOTAL RUNOFF(CFS) =     345.78
 TC(MIN.) =   31.49

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
 UPSTREAM ELEVATION(FEET) = 1510.00  DOWNSTREAM ELEVATION(FEET) = 1500.00
 STREET LENGTH(FEET) =  1870.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =     421.43
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  1.33
  HALFSTREET FLOOD WIDTH(FEET) =   63.23
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.51
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    7.33
 STREET FLOW TRAVEL TIME(MIN.) =   5.66   Tc(MIN.) =   37.15
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.749
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8663
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   99.90      SUBAREA RUNOFF(CFS) =  151.40
```

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 TOTAL AREA(ACRES) =      392.1       PEAK FLOW RATE(CFS) =     497.18

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.41   HALFSTREET FLOOD WIDTH(FEET) =  67.26
 FLOW VELOCITY(FEET/SEC.) =  5.71   DEPTH*VELOCITY(FT*FT/SEC.) =   8.06
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 1870.0 FT WITH ELEVATION-DROP =  10.0 FT, IS  216.2 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    104.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =   10180.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1500.00  DOWNSTREAM ELEVATION(FEET) = 1475.00
 STREET LENGTH(FEET) =  1670.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =     568.37
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  1.23
  HALFSTREET FLOOD WIDTH(FEET) =   58.41
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.77
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =   10.83
 STREET FLOW TRAVEL TIME(MIN.) =   3.17   Tc(MIN.) =   40.32
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.684
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8655
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   97.70      SUBAREA RUNOFF(CFS) =  142.40
 TOTAL AREA(ACRES) =      489.8       PEAK FLOW RATE(CFS) =     639.58

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.29   HALFSTREET FLOOD WIDTH(FEET) =  60.97
 FLOW VELOCITY(FEET/SEC.) =  9.02   DEPTH*VELOCITY(FT*FT/SEC.) =  11.60
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 1670.0 FT WITH ELEVATION-DROP =  25.0 FT, IS  238.2 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    105.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =   11850.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1475.00  DOWNSTREAM ELEVATION(FEET) = 1460.00
 STREET LENGTH(FEET) =  1490.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =     709.76
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  1.43
  HALFSTREET FLOOD WIDTH(FEET) =   68.23
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.91
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =   11.33
 STREET FLOW TRAVEL TIME(MIN.) =   3.14   Tc(MIN.) =   43.46
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.626
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8647
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   99.80     SUBAREA RUNOFF(CFS) =  140.36
 TOTAL AREA(ACRES) =      589.6      PEAK FLOW RATE(CFS) =     779.94

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.48   HALFSTREET FLOOD WIDTH(FEET) =  70.74
 FLOW VELOCITY(FEET/SEC.) =  8.07   DEPTH*VELOCITY(FT*FT/SEC.) =  11.96
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 1490.0 FT WITH ELEVATION-DROP =  15.0 FT, IS  239.4 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    106.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =   13340.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1460.00  DOWNSTREAM ELEVATION(FEET) = 1455.00
 STREET LENGTH(FEET) =  1250.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =     847.55
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  1.81
  HALFSTREET FLOOD WIDTH(FEET) =   87.09
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.72
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =   10.34
 STREET FLOW TRAVEL TIME(MIN.) =   3.64   Tc(MIN.) =   47.11
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.567
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8639
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   99.90     SUBAREA RUNOFF(CFS) =  135.21
 TOTAL AREA(ACRES) =      689.5      PEAK FLOW RATE(CFS) =     915.16

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 1.86   HALFSTREET FLOOD WIDTH(FEET) =  89.72
 FLOW VELOCITY(FEET/SEC.) =  5.81   DEPTH*VELOCITY(FT*FT/SEC.) =  10.81
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 1250.0 FT WITH ELEVATION-DROP =   5.0 FT, IS  227.0 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    107.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =   14590.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1455.00  DOWNSTREAM ELEVATION(FEET) = 1450.00
 STREET LENGTH(FEET) =  1530.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =     974.47
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  1.98
```

```
  HALFSTREET FLOOD WIDTH(FEET) =   95.64
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.43
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =   10.75
 STREET FLOW TRAVEL TIME(MIN.) =   4.70   Tc(MIN.) =   51.80
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.499
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8630
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   91.70     SUBAREA RUNOFF(CFS) =  118.62
 TOTAL AREA(ACRES) =      781.2      PEAK FLOW RATE(CFS) =    1033.77

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 2.02   HALFSTREET FLOOD WIDTH(FEET) =  97.84
 FLOW VELOCITY(FEET/SEC.) =  5.50   DEPTH*VELOCITY(FT*FT/SEC.) =  11.13
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 1530.0 FT WITH ELEVATION-DROP =   5.0 FT, IS  196.7 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    108.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =   16120.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1449.00  DOWNSTREAM ELEVATION(FEET) = 1441.00
 STREET LENGTH(FEET) =  2460.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =    1083.56
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  2.06
  HALFSTREET FLOOD WIDTH(FEET) =   99.73
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.54
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =   11.43
 STREET FLOW TRAVEL TIME(MIN.) =   7.40   Tc(MIN.) =   59.20
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.409
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7081
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   99.80     SUBAREA RUNOFF(CFS) =   99.55
 TOTAL AREA(ACRES) =      881.0      PEAK FLOW RATE(CFS) =    1133.33

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 2.10   HALFSTREET FLOOD WIDTH(FEET) = 101.50
 FLOW VELOCITY(FEET/SEC.) =  5.59   DEPTH*VELOCITY(FT*FT/SEC.) =  11.73
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 2460.0 FT WITH ELEVATION-DROP =   8.0 FT, IS  148.2 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    109.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =   18580.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1441.00  DOWNSTREAM ELEVATION(FEET) = 1433.00
 STREET LENGTH(FEET) =  3090.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 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) =    1185.45
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  2.23
  HALFSTREET FLOOD WIDTH(FEET) =  108.03
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.15
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =   11.48
 STREET FLOW TRAVEL TIME(MIN.) =   9.99   Tc(MIN.) =   69.19
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.310
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8600
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   92.50      SUBAREA RUNOFF(CFS) =  104.23
 TOTAL AREA(ACRES) =      973.5       PEAK FLOW RATE(CFS) =    1237.56

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 2.26   HALFSTREET FLOOD WIDTH(FEET) = 109.86
 FLOW VELOCITY(FEET/SEC.) =  5.20   DEPTH*VELOCITY(FT*FT/SEC.) =  11.77
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L = 3090.0 FT WITH ELEVATION-DROP =   8.0 FT, IS  169.8 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    110.00
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =   21670.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      973.5  TC(MIN.) =     69.19
 PEAK FLOW RATE(CFS)   =    1237.56
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

EXISTING 10-YEAR

```
------------------------------------------------------------------------------
******************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                (Rational Tabling Version 23.0)
              Release Date: 07/01/2016  License ID 1537

                    Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS                          *
* EXISTING CONDITION 10-YEAR                                             *
*                                                                        *
 ************************************************************************

  FILE NAME: X:\AES\21077\EX10A.DAT
  TIME/DATE OF STUDY: 11:15 12/06/2022
------------------------------------------------------------------------
  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) =  0.450
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.100
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.725
  SLOPE OF INTENSITY DURATION CURVE = 0.4900
  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(FEET) =   645.00
  UPSTREAM ELEVATION(FEET) =   1442.30
  DOWNSTREAM ELEVATION(FEET) =   1438.70
  ELEVATION DIFFERENCE(FEET) =      3.60
  TC = 0.533*[(  645.00**3)/(     3.60)]**.2 =   19.993
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.242
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .4881
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      3.76
  TOTAL AREA(ACRES) =      6.21   TOTAL RUNOFF(CFS) =      3.76
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       6.2  TC(MIN.) =     19.99
  PEAK FLOW RATE(CFS)   =       3.76
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING 100-YEAR

```
------------------------------------------------------------------------------
******************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                  (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                  (Rational Tabling Version 23.0)
               Release Date: 07/01/2016  License ID 1537

                      Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS                          *
* EXISTING CONDITION 100-YEAR                                            *
*                                                                        *
 ************************************************************************

  FILE NAME: X:\AES\21077\EX100A.DAT
  TIME/DATE OF STUDY: 11:11 12/06/2022
------------------------------------------------------------------------
  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) =  0.450
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.100
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.100
  SLOPE OF INTENSITY DURATION CURVE = 0.4900
  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(FEET) =   645.00
  UPSTREAM ELEVATION(FEET) =   1442.30
  DOWNSTREAM ELEVATION(FEET) =   1438.70
  ELEVATION DIFFERENCE(FEET) =      3.60
  TC = 0.533*[(  645.00**3)/(     3.60)]**.2 =   19.993
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.885
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5785
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      6.77
  TOTAL AREA(ACRES) =      6.21   TOTAL RUNOFF(CFS) =      6.77
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       6.2  TC(MIN.) =     19.99
  PEAK FLOW RATE(CFS)   =       6.77
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

PROPOSED 10-YEAR

```
------------------------------------------------------------------------------
******************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                (Rational Tabling Version 23.0)
              Release Date: 07/01/2016  License ID 1537

                    Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS                          *
* PROPOSED CONDITION 10-YEAR                                             *
*                                                                        *
 ************************************************************************

  FILE NAME: X:\AES\21077\PR10A.DAT
  TIME/DATE OF STUDY: 14:43 12/07/2022
------------------------------------------------------------------------
  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) =  0.450
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.100
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.725
  SLOPE OF INTENSITY DURATION CURVE = 0.4900
  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(FEET) =   410.00
  UPSTREAM ELEVATION(FEET) =   1442.50
  DOWNSTREAM ELEVATION(FEET) =   1439.40
  ELEVATION DIFFERENCE(FEET) =      3.10
  TC = 0.303*[(  410.00**3)/(     3.10)]**.2 =    8.933
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.842
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8674
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      2.64
  TOTAL AREA(ACRES) =      1.65   TOTAL RUNOFF(CFS) =      2.64

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.842
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8674
```

```
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.48   SUBAREA RUNOFF(CFS) =    0.77
 TOTAL AREA(ACRES) =       2.1   TOTAL RUNOFF(CFS) =      3.40
 TC(MIN.) =    8.93

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.842
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8674
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.26   SUBAREA RUNOFF(CFS) =    0.42
 TOTAL AREA(ACRES) =       2.4   TOTAL RUNOFF(CFS) =      3.82
 TC(MIN.) =    8.93

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.842
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8674
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    0.40
 TOTAL AREA(ACRES) =       2.6   TOTAL RUNOFF(CFS) =      4.22
 TC(MIN.) =    8.93

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.842
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8674
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    0.61
 TOTAL AREA(ACRES) =       3.0   TOTAL RUNOFF(CFS) =      4.83
 TC(MIN.) =    8.93

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.842
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8674
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.37   SUBAREA RUNOFF(CFS) =    0.59
 TOTAL AREA(ACRES) =       3.4   TOTAL RUNOFF(CFS) =      5.42
 TC(MIN.) =    8.93

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.842
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8674
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    0.40
 TOTAL AREA(ACRES) =       3.6   TOTAL RUNOFF(CFS) =      5.82
 TC(MIN.) =    8.93

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.842
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8674
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.35   SUBAREA RUNOFF(CFS) =    0.56
 TOTAL AREA(ACRES) =       4.0   TOTAL RUNOFF(CFS) =      6.38
 TC(MIN.) =    8.93

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1435.90  DOWNSTREAM(FEET) =  1435.49
 FLOW LENGTH(FEET) =    71.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.25
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.38
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    9.16
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     481.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.820
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8671
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.35   SUBAREA RUNOFF(CFS) =    0.55
 TOTAL AREA(ACRES) =       4.3   TOTAL RUNOFF(CFS) =       6.93
 TC(MIN.) =    9.16

****************************************************************************
 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) =  1435.49  DOWNSTREAM(FEET) =  1435.30
 FLOW LENGTH(FEET) =   103.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.40
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.93
 PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    9.66
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     584.00 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) =  1.773
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8666
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.46   SUBAREA RUNOFF(CFS) =    0.71
 TOTAL AREA(ACRES) =       4.8   TOTAL RUNOFF(CFS) =       7.64
 TC(MIN.) =    9.66

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    111.00 IS CODE =  31
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1435.80  DOWNSTREAM(FEET) =  1435.09
 FLOW LENGTH(FEET) =   345.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.74
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.64
 PIPE TRAVEL TIME(MIN.) =   1.54    Tc(MIN.) =   11.20
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =     929.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 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.) =   11.20
 RAINFALL INTENSITY(INCH/HR) =   1.65
 TOTAL STREAM AREA(ACRES) =     4.80
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.64

****************************************************************************
 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(FEET) =   305.00
 UPSTREAM ELEVATION(FEET) =   1440.33
 DOWNSTREAM ELEVATION(FEET) =   1438.51
 ELEVATION DIFFERENCE(FEET) =      1.82
 TC = 0.303*[(  305.00**3)/(     1.82)]**.2 =    8.321
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.908
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8681
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      0.88
 TOTAL AREA(ACRES) =      0.53   TOTAL RUNOFF(CFS) =      0.88

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 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.) =    8.32
 RAINFALL INTENSITY(INCH/HR) =   1.91
 TOTAL STREAM AREA(ACRES) =     0.53
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.88

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc     INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       7.64    11.20       1.649         4.80
    2       0.88     8.32       1.908         0.53

 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       6.55     8.32       1.908
    2       8.39    11.20       1.649

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      8.39   Tc(MIN.) =   11.20
 TOTAL AREA(ACRES) =       5.3
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =     929.00 FEET.

****************************************************************************
 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) =  1.649
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5504
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.45   SUBAREA RUNOFF(CFS) =    0.41
 TOTAL AREA(ACRES) =       5.8   TOTAL RUNOFF(CFS) =      8.80
 TC(MIN.) =   11.20

****************************************************************************
 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) =  1.649
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5504
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.43   SUBAREA RUNOFF(CFS) =    0.39
 TOTAL AREA(ACRES) =       6.2   TOTAL RUNOFF(CFS) =      9.19
 TC(MIN.) =   11.20
============================================================================
```

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 6.2 TC(MIN.) = 11.20
PEAK FLOW RATE(CFS) = 9.19
*** PEAK FLOW RATE TABLE ***

	Q(CFS)	Tc(MIN.)
1	7.53	8.32
2	9.19	11.20

==========
==========
END OF RATIONAL METHOD ANALYSIS

PROPOSED 100-YEAR

```
------------------------------------------------------------------------------
******************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2016 Advanced Engineering Software (aes)
                (Rational Tabling Version 23.0)
              Release Date: 07/01/2016  License ID 1537

                    Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS                          *
* PROPOSED CONDITION 100-YEAR                                            *
*                                                                        *
 ************************************************************************

  FILE NAME: X:\AES\21077\PR100A.DAT
  TIME/DATE OF STUDY: 10:35 12/07/2022
------------------------------------------------------------------------
  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) =  0.450
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.100
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.100
  SLOPE OF INTENSITY DURATION CURVE = 0.4900
  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(FEET) =   410.00
  UPSTREAM ELEVATION(FEET) =   1442.50
  DOWNSTREAM ELEVATION(FEET) =   1439.40
  ELEVATION DIFFERENCE(FEET) =      3.10
  TC = 0.303*[(  410.00**3)/(     3.10)]**.2 =    8.933
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.797
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8755
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      4.04
  TOTAL AREA(ACRES) =      1.65   TOTAL RUNOFF(CFS) =      4.04

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.797
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8755
```

```
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.48   SUBAREA RUNOFF(CFS) =    1.18
 TOTAL AREA(ACRES) =       2.1   TOTAL RUNOFF(CFS) =       5.22
 TC(MIN.) =    8.93

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.797
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8755
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.26   SUBAREA RUNOFF(CFS) =    0.64
 TOTAL AREA(ACRES) =       2.4   TOTAL RUNOFF(CFS) =       5.85
 TC(MIN.) =    8.93

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.797
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8755
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    0.61
 TOTAL AREA(ACRES) =       2.6   TOTAL RUNOFF(CFS) =       6.46
 TC(MIN.) =    8.93

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.797
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8755
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    0.93
 TOTAL AREA(ACRES) =       3.0   TOTAL RUNOFF(CFS) =       7.40
 TC(MIN.) =    8.93

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.797
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8755
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.37   SUBAREA RUNOFF(CFS) =    0.91
 TOTAL AREA(ACRES) =       3.4   TOTAL RUNOFF(CFS) =       8.30
 TC(MIN.) =    8.93

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.797
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8755
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.25   SUBAREA RUNOFF(CFS) =    0.61
 TOTAL AREA(ACRES) =       3.6   TOTAL RUNOFF(CFS) =       8.91
 TC(MIN.) =    8.93

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.797
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8755
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.35   SUBAREA RUNOFF(CFS) =    0.86
 TOTAL AREA(ACRES) =       4.0   TOTAL RUNOFF(CFS) =       9.77
 TC(MIN.) =    8.93

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1435.90  DOWNSTREAM(FEET) =  1435.49
 FLOW LENGTH(FEET) =    71.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.83
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.77
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    9.14
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     481.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.766
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8753
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.35   SUBAREA RUNOFF(CFS) =    0.85
 TOTAL AREA(ACRES) =       4.3   TOTAL RUNOFF(CFS) =      10.62
 TC(MIN.) =    9.14

****************************************************************************
 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) =  1435.49  DOWNSTREAM(FEET) =  1435.30
 FLOW LENGTH(FEET) =   103.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.88
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.62
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    9.58
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     584.00 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) =  2.703
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8749
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.46   SUBAREA RUNOFF(CFS) =    1.09
 TOTAL AREA(ACRES) =       4.8   TOTAL RUNOFF(CFS) =      11.71
 TC(MIN.) =    9.58

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    111.00 IS CODE =  31
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1435.80  DOWNSTREAM(FEET) =  1435.09
 FLOW LENGTH(FEET) =   345.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.14
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.71
 PIPE TRAVEL TIME(MIN.) =   1.39    Tc(MIN.) =   10.97
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =     929.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 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.) =   10.97
 RAINFALL INTENSITY(INCH/HR) =   2.53
 TOTAL STREAM AREA(ACRES) =     4.80
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.71

****************************************************************************
 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(FEET) =   305.00
 UPSTREAM ELEVATION(FEET) =   1440.33
 DOWNSTREAM ELEVATION(FEET) =   1438.51
 ELEVATION DIFFERENCE(FEET) =      1.82
 TC = 0.303*[(  305.00**3)/(     1.82)]**.2 =    8.321
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.896
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8761
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      1.34
 TOTAL AREA(ACRES) =      0.53   TOTAL RUNOFF(CFS) =      1.34

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 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.) =    8.32
 RAINFALL INTENSITY(INCH/HR) =   2.90
 TOTAL STREAM AREA(ACRES) =     0.53
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.34

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc     INTENSITY     AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1       11.71    10.97       2.529         4.80
    2        1.34     8.32       2.896         0.53

 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       10.23     8.32       2.896
    2       12.88    10.97       2.529

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      12.88   Tc(MIN.) =   10.97
 TOTAL AREA(ACRES) =       5.3
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =     929.00 FEET.

****************************************************************************
 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) =  2.529
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6364
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.45   SUBAREA RUNOFF(CFS) =    0.72
 TOTAL AREA(ACRES) =       5.8   TOTAL RUNOFF(CFS) =      13.60
 TC(MIN.) =   10.97

****************************************************************************
 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) =  2.529
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .6364
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    0.43   SUBAREA RUNOFF(CFS) =    0.69
 TOTAL AREA(ACRES) =       6.2   TOTAL RUNOFF(CFS) =      14.30
 TC(MIN.) =   10.97
============================================================================
```

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 6.2 TC(MIN.) = 10.97
PEAK FLOW RATE(CFS) = 14.30
*** PEAK FLOW RATE TABLE ***

	Q(CFS)	Tc(MIN.)
1	11.91	8.32
2	14.30	10.97

==========
==========
END OF RATIONAL METHOD ANALYSIS

APPENDIX E – CATCH BASIN CALCULATIONS

Catch basin capacity is determined by the design capacity found by the Equation:

$Q_w = C_w P h^{1.5} * 0.50$ ← 0.50 factor to account for 50 percent clogging

Or $h = [(2 * Q_w) / (3 * P)]^{2/3}$

Where
Q_w = 100-Year Flow Rate
W = Width of Grate parallel to curb
L = Length of Grate Perpendicular to cub
C_w = Wier Coefficient = 3
P = Open Perimeter =
h = Allowable head on grate

Subarea	Area Draining to Catch Basin (acres)	Flow Rate Q_w (cfs)	Perimeter P (ft)	Required Head h (ft)	Available Head h (ft)
1.01	1.65	4.04	2 x (2 + 3) = 10.00	0.42	0.50
1.10	0.46	1.09	2 x (2 + 3) = 10.00	0.17	0.50
1.11	0.53	1.34	4 x 2 = 8.00	0.23	0.50
1.12	0.45	0.72	4 x 2 = 8.00	0.15	0.25
1.13	0.43	0.70	4 x 2 = 8.00	0.15	0.25

APPENDIX F – HYDRAULIC CALCULATIONS

Storm Drain Pipe Sizing Calculations

```
==============================================================================
 Problem Descriptions:
  DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS
  PROPOSED CONDITION 100-YEAR
  STORM DRAIN IN LOADING DOCK DOWNSTREAM OF SUBAREA 1.02
******************************************************************************
>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
------------------------------------------------------------------------------
   PIPE DIAMETER(FEET) =   0.670
   PIPE SLOPE(FEET/FEET) =  0.0070
   PIPEFLOW(CFS) =        1.18
   MANNINGS FRICTION FACTOR = 0.012000
==============================================================================
   CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
   CRITICAL DEPTH(FEET) =     0.51
   CRITICAL FLOW AREA(SQUARE FEET) =     0.290
   CRITICAL FLOW TOP-WIDTH(FEET) =   0.566
   CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          9.29
   CRITICAL FLOW VELOCITY(FEET/SEC.) =     4.064
   CRITICAL FLOW VELOCITY HEAD(FEET) =          0.26
   CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.51
   CRITICAL FLOW SPECIFIC ENERGY(FEET) =          0.77
   NOTE:GIVEN NORMAL DEPTH IS LOWER VALUE OF TWO POSSIBLE.
   SUGGEST CONSIDERATION OF WAVE ACTION, UNCERTAINTY, ETC.
==============================================================================
   NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
   NORMAL DEPTH(FEET) =      0.60 ← LESS THAN 8" OK
   FLOW AREA(SQUARE FEET) =      0.33
   FLOW TOP-WIDTH(FEET) =     0.411
   FLOW PRESSURE + MOMENTUM(POUNDS) =          8.11
   FLOW VELOCITY(FEET/SEC.) =         3.546
   FLOW VELOCITY HEAD(FEET) =         0.195
   HYDRAULIC DEPTH(FEET) =      0.81
   FROUDE NUMBER =     0.695
   SPECIFIC ENERGY(FEET) =          0.79
==============================================================================
```

```
==============================================================================
 Problem Descriptions:
  DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS
  PROPOSED CONDITION 100-YEAR
  STORM DRAIN IN LOADIN GDOCK DOWNSTREAM OF SUBAREA 1.03
******************************************************************************
>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
------------------------------------------------------------------------------
   PIPE DIAMETER(FEET) =   1.000
   PIPE SLOPE(FEET/FEET) =  0.0050
   PIPEFLOW(CFS) =        1.82
   MANNINGS FRICTION FACTOR = 0.012000
==============================================================================
   CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
   CRITICAL DEPTH(FEET) =      0.57
   CRITICAL FLOW AREA(SQUARE FEET) =     0.467
   CRITICAL FLOW TOP-WIDTH(FEET) =   0.989
   CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         20.92
   CRITICAL FLOW VELOCITY(FEET/SEC.) =     3.899
   CRITICAL FLOW VELOCITY HEAD(FEET) =          0.24
   CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.47
   CRITICAL FLOW SPECIFIC ENERGY(FEET) =          0.81
==============================================================================
   NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
   NORMAL DEPTH(FEET) =      0.60 ← LESS THAN 12" OK
   FLOW AREA(SQUARE FEET) =      0.49
   FLOW TOP-WIDTH(FEET) =     0.981
   FLOW PRESSURE + MOMENTUM(POUNDS) =         20.98
   FLOW VELOCITY(FEET/SEC.) =         3.721
   FLOW VELOCITY HEAD(FEET) =         0.215
   HYDRAULIC DEPTH(FEET) =      0.50
   FROUDE NUMBER =     0.928
   SPECIFIC ENERGY(FEET) =          0.81
==============================================================================
```

```
==============================================================================
 Problem Descriptions:
  DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS
  PROPOSED CONDITION 100-YEAR
  STORM DRAIN IN LOADING DOCK DOWNSTREAM OF SUBAREA 1.04
******************************************************************************
>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
------------------------------------------------------------------------------
    PIPE DIAMETER(FEET) =   1.000
    PIPE SLOPE(FEET/FEET) =  0.0050
    PIPEFLOW(CFS) =        2.43
    MANNINGS FRICTION FACTOR = 0.012000
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL DEPTH(FEET) =      0.67
    CRITICAL FLOW AREA(SQUARE FEET) =     0.557
    CRITICAL FLOW TOP-WIDTH(FEET) =   0.942
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         30.72
    CRITICAL FLOW VELOCITY(FEET/SEC.) =     4.363
    CRITICAL FLOW VELOCITY HEAD(FEET) =          0.30
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.59
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =          0.96
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =      0.74 ← LESS THAN 12" OK
    FLOW AREA(SQUARE FEET) =      0.62
    FLOW TOP-WIDTH(FEET) =     0.883
    FLOW PRESSURE + MOMENTUM(POUNDS) =         31.16
    FLOW VELOCITY(FEET/SEC.) =         3.927
    FLOW VELOCITY HEAD(FEET) =         0.239
    HYDRAULIC DEPTH(FEET) =      0.70
    FROUDE NUMBER =     0.827
    SPECIFIC ENERGY(FEET) =          0.97
==============================================================================
```

```
==============================================================================
 Problem Descriptions:
  DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS
  PROPOSED CONDTION 100-YEAR
  STORM DRAIN IN LOADING DOCK DOWNSTREAM OF SUBAREA 1.05
******************************************************************************
>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
------------------------------------------------------------------------------
   PIPE DIAMETER(FEET) =   1.250
   PIPE SLOPE(FEET/FEET) =  0.0050
   PIPEFLOW(CFS) =        3.36
   MANNINGS FRICTION FACTOR = 0.012000
==============================================================================
   CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
   CRITICAL DEPTH(FEET) =      0.74
   CRITICAL FLOW AREA(SQUARE FEET) =     0.755
   CRITICAL FLOW TOP-WIDTH(FEET) =   1.229
   CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         43.97
   CRITICAL FLOW VELOCITY(FEET/SEC.) =     4.448
   CRITICAL FLOW VELOCITY HEAD(FEET) =          0.31
   CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.61
   CRITICAL FLOW SPECIFIC ENERGY(FEET) =          1.05
==============================================================================
   NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
   NORMAL DEPTH(FEET) =      0.76 ← LESS THAN 15" OK
   FLOW AREA(SQUARE FEET) =      0.78
   FLOW TOP-WIDTH(FEET) =     1.223
   FLOW PRESSURE + MOMENTUM(POUNDS) =         44.01
   FLOW VELOCITY(FEET/SEC.) =         4.334
   FLOW VELOCITY HEAD(FEET) =         0.292
   HYDRAULIC DEPTH(FEET) =      0.63
   FROUDE NUMBER =     0.959
   SPECIFIC ENERGY(FEET) =          1.05
==============================================================================
```

```
==============================================================================
 Problem Descriptions:
  DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS
  PROPOSED CONDITION 100-YEAR
  STORM DRAIN IN LOADING DOCK DOWNSTREAM OF SUBAREA 1.06
******************************************************************************
>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
------------------------------------------------------------------------------
   PIPE DIAMETER(FEET) =   1.250
   PIPE SLOPE(FEET/FEET) =  0.0050
   PIPEFLOW(CFS) =        4.27
   MANNINGS FRICTION FACTOR = 0.012000
==============================================================================
   CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
   CRITICAL DEPTH(FEET) =      0.84
   CRITICAL FLOW AREA(SQUARE FEET) =     0.873
   CRITICAL FLOW TOP-WIDTH(FEET) =   1.176
   CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         60.47
   CRITICAL FLOW VELOCITY(FEET/SEC.) =     4.890
   CRITICAL FLOW VELOCITY HEAD(FEET) =          0.37
   CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.74
   CRITICAL FLOW SPECIFIC ENERGY(FEET) =          1.21
==============================================================================
   NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
   NORMAL DEPTH(FEET) =      0.90 ← LESS THAN 15" OK
   FLOW AREA(SQUARE FEET) =      0.94
   FLOW TOP-WIDTH(FEET) =     1.127
   FLOW PRESSURE + MOMENTUM(POUNDS) =         60.84
   FLOW VELOCITY(FEET/SEC.) =         4.537
   FLOW VELOCITY HEAD(FEET) =         0.320
   HYDRAULIC DEPTH(FEET) =      0.84
   FROUDE NUMBER =     0.875
   SPECIFIC ENERGY(FEET) =          1.22
==============================================================================
```

```
==============================================================================
 Problem Descriptions:
  DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS
  PROPOSED CONDITION 100-YEAR
  STORM DRAIN IN LOADING DOCK DOWNSTREAM OF SUBAREA 1.07
******************************************************************************
>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
------------------------------------------------------------------------------
    PIPE DIAMETER(FEET) =   1.250
    PIPE SLOPE(FEET/FEET) =  0.0050
    PIPEFLOW(CFS) =        4.88
    MANNINGS FRICTION FACTOR = 0.012000
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL DEPTH(FEET) =      0.90
    CRITICAL FLOW AREA(SQUARE FEET) =     0.941
    CRITICAL FLOW TOP-WIDTH(FEET) =   1.127
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         72.33
    CRITICAL FLOW VELOCITY(FEET/SEC.) =     5.186
    CRITICAL FLOW VELOCITY HEAD(FEET) =          0.42
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.84
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =          1.31
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =      1.01 ← LESS THAN 15" OK
    FLOW AREA(SQUARE FEET) =      1.06
    FLOW TOP-WIDTH(FEET) =     0.986
    FLOW PRESSURE + MOMENTUM(POUNDS) =         73.96
    FLOW VELOCITY(FEET/SEC.) =         4.597
    FLOW VELOCITY HEAD(FEET) =         0.328
    HYDRAULIC DEPTH(FEET) =      1.08
    FROUDE NUMBER =     0.781
    SPECIFIC ENERGY(FEET) =          1.34
==============================================================================
```

```
==============================================================================
 Problem Descriptions:
  DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS
  PROPOSED CONDITION 100-YEAR
  STORM DRAIN IN LOADING DOCK DOWNSTREAM OF SUBAREA 1.08
******************************************************************************
>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
------------------------------------------------------------------------------
    PIPE DIAMETER(FEET) =   2.000
    PIPE SLOPE(FEET/FEET) =  0.0050
    PIPEFLOW(CFS) =        9.77
    MANNINGS FRICTION FACTOR = 0.012000
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL DEPTH(FEET) =      1.12
    CRITICAL FLOW AREA(SQUARE FEET) =     1.806
    CRITICAL FLOW TOP-WIDTH(FEET) =   1.986
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         156.17
    CRITICAL FLOW VELOCITY(FEET/SEC.) =     5.411
    CRITICAL FLOW VELOCITY HEAD(FEET) =          0.45
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.91
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =          1.57
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =      1.07 ← LESS THAN 24" OK
    FLOW AREA(SQUARE FEET) =      1.72
    FLOW TOP-WIDTH(FEET) =     1.994
    FLOW PRESSURE + MOMENTUM(POUNDS) =         156.66
    FLOW VELOCITY(FEET/SEC.) =         5.681
    FLOW VELOCITY HEAD(FEET) =         0.501
    HYDRAULIC DEPTH(FEET) =      0.86
    FROUDE NUMBER =     1.078
    SPECIFIC ENERGY(FEET) =          1.58
==============================================================================
```

```
==============================================================================
 Problem Descriptions:
  DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS
  PROPOSED CONDITION 100-YEAR
  STORM DRAIN IN LOADING DOCK DOWNSTREAM OF SUBAREA 1.09
******************************************************************************
>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
------------------------------------------------------------------------------
    PIPE DIAMETER(FEET) =   2.000
    PIPE SLOPE(FEET/FEET) =  0.0050
    PIPEFLOW(CFS) =       10.62
    MANNINGS FRICTION FACTOR = 0.012000
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL DEPTH(FEET) =      1.17
    CRITICAL FLOW AREA(SQUARE FEET) =     1.904
    CRITICAL FLOW TOP-WIDTH(FEET) =   1.972
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        174.40
    CRITICAL FLOW VELOCITY(FEET/SEC.) =     5.577
    CRITICAL FLOW VELOCITY HEAD(FEET) =          0.48
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.97
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =          1.65
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =      1.13 ← LESS THAN 24" OK
    FLOW AREA(SQUARE FEET) =      1.83
    FLOW TOP-WIDTH(FEET) =     1.983
    FLOW PRESSURE + MOMENTUM(POUNDS) =        174.57
    FLOW VELOCITY(FEET/SEC.) =         5.794
    FLOW VELOCITY HEAD(FEET) =         0.521
    HYDRAULIC DEPTH(FEET) =      0.92
    FROUDE NUMBER =     1.062
    SPECIFIC ENERGY(FEET) =          1.65
==============================================================================
```

```
==============================================================================
 Problem Descriptions:
  DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS
  PROPOSED CONDITION 100-YEAR
  STORM DRAIN IN EAST PARKING LOT DOWNSTREAM OF SUBAREA 1.10
******************************************************************************
>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
------------------------------------------------------------------------------
   PIPE DIAMETER(FEET) =   2.000
   PIPE SLOPE(FEET/FEET) =  0.0020
   PIPEFLOW(CFS) =       11.71
   MANNINGS FRICTION FACTOR = 0.012000
==============================================================================
   CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
   CRITICAL DEPTH(FEET) =     1.23
   CRITICAL FLOW AREA(SQUARE FEET) =    2.024
   CRITICAL FLOW TOP-WIDTH(FEET) =   1.947
   CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        198.52
   CRITICAL FLOW VELOCITY(FEET/SEC.) =    5.786
   CRITICAL FLOW VELOCITY HEAD(FEET) =         0.52
   CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     1.04
   CRITICAL FLOW SPECIFIC ENERGY(FEET) =         1.75
   NOTE:GIVEN NORMAL DEPTH IS LOWER VALUE OF TWO POSSIBLE.
   SUGGEST CONSIDERATION OF WAVE ACTION, UNCERTAINTY, ETC.
==============================================================================
   NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
   NORMAL DEPTH(FEET) =     1.81 ← LESS THAN 24" OK
   FLOW AREA(SQUARE FEET) =     2.99
   FLOW TOP-WIDTH(FEET) =    1.169
   FLOW PRESSURE + MOMENTUM(POUNDS) =        248.98
   FLOW VELOCITY(FEET/SEC.) =        3.914
   FLOW VELOCITY HEAD(FEET) =        0.238
   HYDRAULIC DEPTH(FEET) =     2.56
   FROUDE NUMBER =    0.431
   SPECIFIC ENERGY(FEET) =         2.05
==============================================================================
```

```
==============================================================================
 Problem Descriptions:
  DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS
  PROPOSED CONDITION 100-YEAR
  STORM DRAIN IN WEST LANDSCAPE, SUBAREA 1.12
******************************************************************************
>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
------------------------------------------------------------------------------
    PIPE DIAMETER(FEET) =   0.670
    PIPE SLOPE(FEET/FEET) =  0.0040
    PIPEFLOW(CFS) =        0.72
    MANNINGS FRICTION FACTOR = 0.012000
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL DEPTH(FEET) =      0.40
    CRITICAL FLOW AREA(SQUARE FEET) =     0.220
    CRITICAL FLOW TOP-WIDTH(FEET) =   0.657
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          6.94
    CRITICAL FLOW VELOCITY(FEET/SEC.) =     3.280
    CRITICAL FLOW VELOCITY HEAD(FEET) =          0.17
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.33
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =          0.57
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =      0.48 ← LESS THAN 8" OK
    FLOW AREA(SQUARE FEET) =      0.27
    FLOW TOP-WIDTH(FEET) =     0.606
    FLOW PRESSURE + MOMENTUM(POUNDS) =          6.63
    FLOW VELOCITY(FEET/SEC.) =         2.675
    FLOW VELOCITY HEAD(FEET) =         0.111
    HYDRAULIC DEPTH(FEET) =      0.44
    FROUDE NUMBER =     0.707
    SPECIFIC ENERGY(FEET) =          0.59
==============================================================================
```

```
==============================================================================
 Problem Descriptions:
  DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS
  PROPOSED CONDITION 100-YEAR
  STORM DRAIN IN SOUTH LANDSCAPE, SUBAREA 1.13
******************************************************************************
>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<
------------------------------------------------------------------------------
    PIPE DIAMETER(FEET) =   0.830
    PIPE SLOPE(FEET/FEET) =  0.0040
    PIPEFLOW(CFS) =        1.42
    MANNINGS FRICTION FACTOR = 0.012000
==============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    CRITICAL DEPTH(FEET) =      0.53
    CRITICAL FLOW AREA(SQUARE FEET) =     0.368
    CRITICAL FLOW TOP-WIDTH(FEET) =   0.795
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =         15.97
    CRITICAL FLOW VELOCITY(FEET/SEC.) =     3.860
    CRITICAL FLOW VELOCITY HEAD(FEET) =          0.23
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =      0.46
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =          0.77
==============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =      0.65 ← LESS THAN 10" OK
    FLOW AREA(SQUARE FEET) =      0.45
    FLOW TOP-WIDTH(FEET) =     0.685
    FLOW PRESSURE + MOMENTUM(POUNDS) =         16.93
    FLOW VELOCITY(FEET/SEC.) =         3.125
    FLOW VELOCITY HEAD(FEET) =         0.152
    HYDRAULIC DEPTH(FEET) =      0.66
    FROUDE NUMBER =     0.676
    SPECIFIC ENERGY(FEET) =          0.80
==============================================================================
```

```
==============================================================================
 Problem Descriptions:
  DED21077 PLACENTIA AVE & REDLANDS AVE, PERRIS
  PROPOSED CONDITION 100-YEAR
  PARKWAY DRAIN AT S.E. CORNER OF SITE TO PLACENTIA AVE
******************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
------------------------------------------------------------------------------
   CHANNEL Z1(HORIZONTAL/VERTICAL) =    0.00
        Z2(HORIZONTAL/VERTICAL) =    0.00
   BASEWIDTH(FEET) =     6.00
   CONSTANT CHANNEL SLOPE(FEET/FEET) = 0.020000
   UNIFORM FLOW(CFS) =       12.70 ← 14.30 cfs site runoff – 1.60 cfs pump in Line H
   MANNINGS FRICTION FACTOR = 0.0140
==============================================================================
   NORMAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
   >>>>> NORMAL DEPTH(FEET) =   0.32 ← LESS THAN 4" OK
   FLOW TOP-WIDTH(FEET) =        6.00
   FLOW AREA(SQUARE FEET) =         1.93
   HYDRAULIC DEPTH(FEET) =     0.32
   FLOW AVERAGE VELOCITY(FEET/SEC.) =     6.57
   UNIFORM FROUDE NUMBER =    2.038
   PRESSURE + MOMENTUM(POUNDS) =        181.06
   AVERAGED VELOCITY HEAD(FEET) =      0.670
   SPECIFIC ENERGY(FEET) =      0.992
==============================================================================
   CRITICAL-DEPTH FLOW INFORMATION:
------------------------------------------------------------------------------
   CRITICAL FLOW TOP-WIDTH(FEET) =        6.00
   CRITICAL FLOW AREA(SQUARE FEET) =         3.11
   CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     0.52
   CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.08
   CRITICAL DEPTH(FEET) =     0.52
   CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =        150.80
   AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      0.259
   CRITICAL FLOW SPECIFIC ENERGY(FEET) =      0.777
==============================================================================
```

Rip Rap Sizing Calculations

Rip rap pad dimension requirement is determined by the equation:

$L_{sp} / D_o = 1.7 \times [Q / (D_o)^{5/2}] + 8$

Where
L_{sp} = Length of rip rap pad required
D_o = Equivalent discharge pipe diameter
Q = Tributary flow

Rip rap requirement downstream end of proposed Line H

D_o = 6" (force main) = 0.50' Q100 = 1.60 cfs

$L_{sp} / D_o = [1.7 \times 1.60 / (0.50^{5/2})] + 8 = 23.39$

Length of Rip Rap Pad: $L_{sp} = 0.50 \times 23.39 = 11.69$ ft → 12.0 ft

Upstream width = $3 D_o = 1.5$ ft

Downstream width = $½ L_{sp} + 3 D_o = 5.85 + 1.5 = 7.35$ ft → 7.4 ft

Flow Velocity V = Q100 / Pipe Cross-Section Area
= 1.60 cfs / [3.14 x $(0.25 \text{ ft})^2$] = 8.15 fps

Minimum rock size per Rock Diameter vs. Bottom Velocity graph (see next page) = 10 inch

Residual Storm Volume to be Pumped at Downstream End of Line H

Double 10 ft x 7 ft RC Box, from Station 10+00 to Station 16+60:
= 2 x 10 ft x 7 ft x 660 ft
= 92,400 CF

36-inch pipe, from Station 16+60 to Station 19+42:
= 3.14 x $(1.50 \text{ ft})^2$ x 282 ft
= 1,993 CF

City-maintained detention basin above elevation 1433.12 (invert at upstream end of 36-inch pipe) and below elevation 1437.23 (water surface elevation):
= 43,921 CF (See basin volume chart below)

Elevation (ft)	Area (SF)	Volume (CF)	Cumulative Volume (CF)
1433.12	7,988	0	0
1434.00	9,208	7,566	7,566
1435.00	10,407	9,808	17,374
1436.00	11,682	11,045	28,418
1437.00	13,178	12,430	40,848
1437.23	13,543	3,073	43,921

Total residual storm volume to be pumped
= 92,400 + 1,993 , 43,921
= 138,314 CF

Flow rate required to pump dry in 24 hours:
= (138,314 CF / 24 HR) x (1 HR / 3,600 sec)
= 1.60 cfs
= 718 gpm (1.00 cfs = 448.8 gpm)

APPENDIX G – HYDROLOGY MAPS

LEGEND

- LIMIT OF DRAINAGE MANAGEMENT AREA
- LIMIT OF SUBAREA
- FLOWPATH
- NODE 200 / EL 901.01 — NODE / CONCENTRATION POINT / ELEVATION
- 99.8 AC — AREA IN ACRES
- Q_{25} = 1.17 cfs — TOTAL DESIGN FLOW
- Q_{10} = 0.94 cfs — ALLOWABLE FLOW
- PATH OF FLOW

NOTICE TO CONTRACTOR

THE CONTRACTOR SHALL ASCERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION AND SIZE OF ALL UTILITIES, PIPES, AND/OR STRUCTURES AND SHALL BE RESPONSIBLE FOR DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES, SHOWN OR NOT SHOWN HEREON.

IMPORTANT NOTICE

Section 4216 of the Government Code requires a Dig Alert Identification Number be issued before a "Permit to Excavate" will be valid. For your Dig Alert I.D. Number call Underground Service Alert CALL 811 Two working days before you dig.

800 400 0 800 1600 2400

SCALE: 1"=800'

NO.	REVISIONS	DATE

Prepared by:
Joseph C. Truxaw and Associates, Inc.
Civil Engineers and Land Surveyors
1915 W. Orangewood Ave., Suite 101, Orange, CA 92868 (714) 935-0265 Truxaw.com

OFFSITE HYDROLOGY MAP

ASSESSOR PARCEL NO. 300-210-010 & 022

PLACENTIA AVENUE AND REDLANDS AVENUE
CITY OF PERRIS, CALIFORNIA

DATE	11/14/2021
DRAWN BY	RCH
CHECKED BY	CDB
JOB NO.	DED21077
SHEET NO.	1 OF 1 SHEETS

LEGEND

- LIMIT OF DRAINAGE MANAGEMENT AREA
- LIMIT OF SUBAREA
- FLOWPATH
- NODE
- CONCENTRATION POINT
- ELEVATION
- 99.8 AC — AREA IN ACRES
- Q_{25} = 1.17 cfs — TOTAL DESIGN FLOW
- Q_{10} = 0.94 cfs — ALLOWABLE FLOW
- PATH OF FLOW

NODE 200
EL 901.01

SUBAREA 1.1
6.21 AC

L=645'

NODE 100
EL=1442.3

NODE 101
EL=1438.7
Q_{10}=3.76 cfs
TC_{10}=20.0 min
Q_{100}=6.77 cfs
TC_{100}=20.0 min

REDLANDS AVE

PLACENTIA AVE

SINGLE STORY MOBILE HOME 2845 REDLANDS AVE

PARCEL MAP NO. 11104
P.M.B. 47/82
PARCEL 3

PARCEL MAP NO. 11104
P.M.B. 47/82
PARCEL 4

SCALE: 1"=20'

NO.	REVISIONS	DATE

Prepared by:
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EXISTING HYDROLOGY MAP

NW CORNER OF PLACENTIA AVENUE AND REDLANDS AVENUE
IN THE CITY OF PERRIS, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

DATE	1-31-22
DRAWN BY	RCH
CHECKED BY	CDB
JOB NO.	DED21077
SHEET NO.	1
	OF 1 SHEETS

LEGEND

- LIMIT OF DRAINAGE MANAGEMENT AREA
- LIMIT OF SUBAREA
- FLOWPATH
- NODE 200 EL 901.01 — NODE / CONCENTRATION POINT / ELEVATION
- 99.8 AC — AREA IN ACRES
- Q_{25} = 1.17 cfs — TOTAL DESIGN FLOW
- Q_{10} = 0.94 cfs — ALLOWABLE FLOW
- PATH OF FLOW

DMA 1 / SUBAREAS 1.01–1.13				
270,628 SF , 6.21 ACRES				
	SURFACE TYPE	AREA SF	AREA AC	%
IMPERVIOUS	CONCRETE, AC PAVEMENT, BUILDING	228,716	5.25	85
PERVIOUS	LANDSCAPE	41,912	0.96	15

NODE 100 EL=1442.50 FS

PIPE 1.02 (8") Q100=1.18 CFS

PIPE 1.03 (12") Q100=1.82 CFS

PIPE 1.04 (12") Q100=2.43 CFS

PIPE 1.05 (15") Q100=3.36 CFS

PIPE 1.06 (15") Q100=4.27 CFS

PIPE 1.07 (15") Q100=4.88 CFS

PIPE 1.08 (24") Q100=9.77 CFS

PIPE 1.09 (24") Q100=10.62 CFS

PIPE 1.10 (24") Q100=11.71 CFS

6" ROOF DRAIN Q100=0.64 CFS

6" ROOF DRAIN Q100=0.61 CFS

6" ROOF DRAIN Q100=0.93 CFS

6" ROOF DRAIN Q100=0.91 CFS

6" ROOF DRAIN Q100=0.61 CFS

6" ROOF DRAIN Q100=0.85 CFS

NODE 101 EL=1439.40 GR =1435.90 INV

NODE 102 EL=1435.49 INV

NODE 103 EL=1435.30 INV

NODE 110 EL=1440.33 FS

CATCH BASIN 1.01 Q100=4.04 CFS

CATCH BASIN 1.10 Q100=1.09 CFS

CATCH BASIN 1.01 Q100=1.34 CFS

NODE 111 EL=1438.51 Q_{10}=9.19 cfs TC_{10}=11.2 min Q_{100}=14.30 cfs TC_{100}=11.0 min

SUMP PUMP Q100=1.60 CFS

RIP RAP PAD

CATCH BASINS 1.12 (TYP.) Q100=0.72 CFS

CATCH BASINS 1.13 (TYP.) Q100=0.70 CFS

LINE H (DOUBLE 10'x7' RCB) Q100=1,238 CFS

LINE H (DOUBLE 10'x7' RCB) Q100=1,238 CFS

SUBAREA 1.01 1.65 AC

SUBAREA 1.02 0.48 AC

SUBAREA 1.03 0.26 AC

SUBAREA 1.04 0.25 AC

SUBAREA 1.05 0.38 AC

SUBAREA 1.06 0.37 AC

SUBAREA 1.07 0.25 AC

SUBAREA 1.08 0.35 AC

SUBAREA 1.09 0.35 AC

SUBAREA 1.10 0.46 AC

SUBAREA 1.11 0.53 AC

SUBAREA 1.12 0.45 AC

SUBAREA 1.13 0.43 AC

PROPOSED INDUSTRIAL BUILDING

UNDERGROUND DETENTION SYSTEM

L=410'

L=71'

L=103'

L=305'

REDLANDS AVENUE

PLACENTIA AVENUE

SCALE: 1"=20'

Prepared by:
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PROPOSED HYDROLOGY MAP

NW CORNER OF PLACENTIA AVENUE AND REDLANDS AVENUE

IN THE CITY OF PERRIS, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

NO.	REVISIONS	DATE

DATE	1-31-22
DRAWN BY	RCH
CHECKED BY	CDB
JOB NO.	DED21077
SHEET NO.	1 OF 1 SHEETS

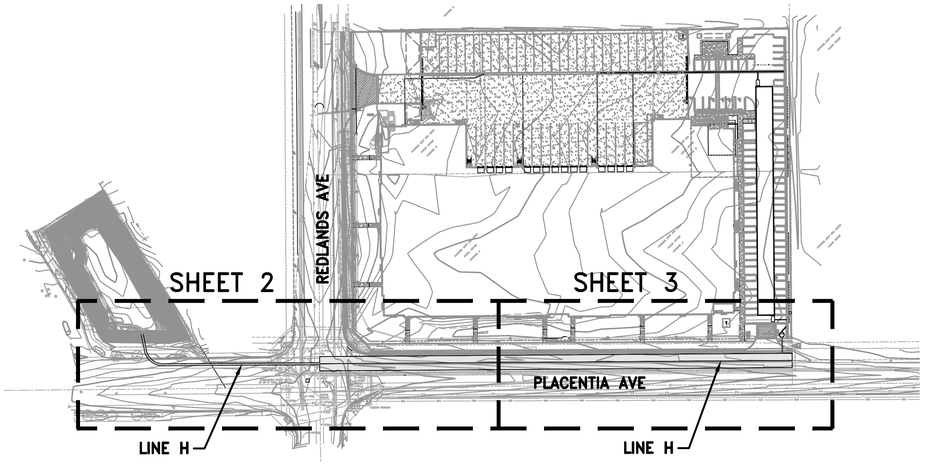
APPENDIX H – REFERENCE PLANS

STORM DRAIN LINE "H" PLAN

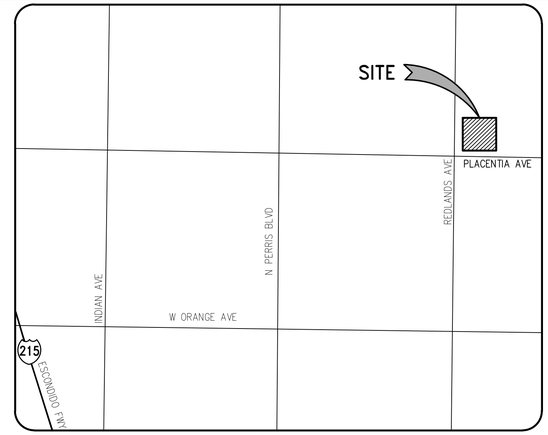
FOR

REDLANDS INDUSTRIAL BUILDING

NW CORNER OF PLACENTIA AVENUE AND REDLANDS AVENUE



INDEX MAP
1" = 100'



VICINITY MAP
NOT TO SCALE

SHEET INDEX

GENERAL NOTES

1. ALL WORK TO BE PERFORMED PER CITY OF PERRIS, RIVERSIDE COUNTY TRANSPORTATION DEPARTMENT (R.C.T.D.), EASTERN MUNICIPAL WATER DISTRICT (E.M.W.D.), CALTRANS AND THE 2014 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.) STANDARDS WITH CALIFORNIA SUPPLEMENT.
2. NOTIFY CITY ENGINEER, CITY OF PERRIS, AT (951) 943-6504, AT LEAST 24 HOURS PRIOR TO START OF CONSTRUCTION.
3. CONTRACTOR IS REQUIRED TO LOCATE AND ADJUST TO GRADE ALL EXISTING MANHOLES, METERS, AND VALVE COVERS FOR WATER, SEWER, TELEPHONE, ELECTRIC, CABLE TV AND OTHER FACILITIES AS REQUIRED (WHETHER CALLED-OUT OR NOT ON PLANS).
4. ALL STRIPING & LEGENDS SHALL BE REPLACED IN ACCORDANCE WITH THE STRIPING PLANS HEREIN. ALL STRIPING TO BE PAINT (TWO COATS) AND ALL MARKINGS (INCLUDING CROSSWALKS) TO BE THERMOPLASTIC. ALL STRIPING AND PAVEMENT MARKINGS TO BE PER 2014 M.U.T.C.D. STANDARDS WITH CALIFORNIA SUPPLEMENT.
5. ALL EXISTING A.C. AND CONCRETE TO BE SAW-CUT WHERE WIDENING IS TO TAKE PLACE OR ADJACENT TO WHERE CONCRETE IS TO BE CONSTRUCTED (1" MINIMUM).
6. ANY STOCKPILE OR STORAGE YARD ON PRIVATE PROPERTY MUST HAVE CITY'S AND OWNERS APPROVAL.
7. THE CITY INSPECTOR WILL MARK ALL CONCRETE REMOVALS PRIOR TO CONSTRUCTION. ALL CONCRETE WILL BE SAW-CUT WHERE REQUIRED PRIOR TO BEING REMOVED.
8. CONTRACTOR SHALL VERIFY THE EXISTENCE OF EXISTING SURVEY MONUMENTS AND PROTECT THEM IN PLACE. ANY SURVEY MONUMENTS MISSING AND/OR DAMAGED DURING CONSTRUCTION WILL HAVE TO BE RESET PRIOR TO PROJECT COMPLETION BY A QUALIFIED REGISTERED SURVEYOR.
9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROTECT THE NEW WORK FROM VANDALISM UNTIL THE IMPROVEMENTS HAVE BEEN ACCEPTED BY THE CITY AND A NOTICE OF COMPLETION HAS BEEN FILED.
10. ALL ASPHALT REMOVALS TO BE MARKED BY THE CITY INSPECTOR PRIOR TO CONTRACTOR BEGINNING WORK ON THAT PARTICULAR STREET SEGMENT.
11. CONTRACTOR SHALL CONTACT UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA AND OTHER UTILITY COMPANIES AS NEEDED TO COORDINATE FOR PROTECTION AND/OR ADJUSTMENTS OF UTILITIES, AS REQUIRED.
12. CONTRACTOR TO VISIT THE SITE AND FAMILIARIZE HIMSELF WITH THE WORK AND AREA PRIOR TO BIDDING AND NOTIFY THE ENGINEER OF RECORD OF DISCREPANCIES.
13. ALL DIMENSIONS ARE APPROXIMATE. CONTRACTOR TO VERIFY IN FIELD.
14. CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL TRAFFIC CONTROL DEVICES AS NEEDED AND PROVIDE TWO WAY ACCESS AT ALL TIMES THROUGH THE SITE. THE CONTRACTOR SHALL MAINTAIN THESE DEVICES AT ALL TIMES INCLUDING HOLIDAYS AND WEEKENDS. FLAGMAN SHALL BE UTILIZED AS REQUIRED TO PROVIDE TWO WAY TRAFFIC DURING CONSTRUCTION.
15. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL IN COMPLIANCE WITH WATCH MANUAL, 2006 M.U.T.C.D., AND THE TRAFFIC PLANS PROVIDED PER SEPARATE PLANS.
16. THE CONTRACTOR SHALL APPLY TO, AND BE ISSUED AN ENCROACHMENT PERMIT BY THE CITY OF PERRIS BEFORE BEGINNING ANY WORK WITHIN AN EXISTING, CITY MAINTAINED PUBLIC STREET AND FOR UTILITY WORK WITHIN OFFERS OF DEDICATION FOR PUBLIC USE.
17. EXISTING PUBLIC STREETS, SHALL REMAIN OPEN TO THE PUBLIC DURING CONSTRUCTION AND SHALL BE MAINTAINED BY THE CONTRACTOR, UNLESS OTHERWISE PROVIDED IN THE PLANS AND SPECIFICATIONS. PUBLIC INCONVENIENCE WILL BE MINIMIZED AT ALL TIMES AND SUCH STREETS SHALL BE LEFT FREE OF DIRT AND DEBRIS AT THE END OF EACH WORKING DAY UNLESS PERMISSION IS OTHERWISE GRANTED BY THE CITY ENGINEER.
18. THE CONTRACTOR IS RESPONSIBLE FOR CLEARING AND GRUBBING THE PROPOSED WORK AREA AND DISPOSAL OF EXCESS OR UNDESIRABLE MATERIAL. CONTRACTOR SHALL RELOCATE OR CAUSE TO BE RELOCATED EXISTING CONFLICTING UTILITIES IF REQUIRED BY CONTRACT.
19. ANY PROPOSED DEVIATION FROM THESE PLANS BY THE CONTRACTOR MUST MEET CITY'S APPROVAL. THE CONTRACTOR IS RESPONSIBLE TO REIMBURSE THE CITY FOR ANY RELATED COST TO THE CITY ASSOCIATED WITH SUCH CHANGE. IN THIS EVENT, NO INCREASE IN CONTRACTOR'S COST WILL BE APPROVED.
20. CONTRACTOR IS REQUIRED TO INSTALL BLUE REFLECTIVE PAVEMENT MARKERS AT ALL FIRE HYDRANT LOCATIONS WITHIN THE PROJECT.
21. THE CONTRACTOR IS REQUIRED TO REMOVE ALL CONFLICTING STRIPING AND LEGENDS BY WET SANDBLASTING OR OTHER APPROVED METHODS.
22. APPLY WEED KILL TO ALL EXISTING WEEDS BETWEEN 1-3 WEEKS PRIOR TO CONSTRUCTION AND REMOVE WEEDS. WEEDS SHALL BE REMOVED FROM ALL EXISTING PAVEMENT, MEDIANS, CURB AND GUTTER, SIDEWALK (BETWEEN CURB AND SIDEWALK) AND WHEREVER IMPROVEMENTS ARE PROPOSED, AND UP TO 4.0' BEHIND E.P. OR CURB WHEN NO SIDEWALK EXISTS.
23. CONTRACTOR SHALL REPLACE ALL STRIPING, LEGENDS, AND SIGNS IF THEY ARE DAMAGED DURING CONSTRUCTION AT NO EXTRA COST TO THE CITY. EXISTING STRIPING WITHIN PROJECT VICINITY THAT BECOME DULL SHALL BE REFRESHED AS DIRECTED BY THE CITY ENGINEER.
24. EXISTING TO PROPOSED CONCRETE PAVEMENT JOINTS SHALL BE CONSTRUCTED PER CALTRANS REVISED STANDARD PLAN RSP P1D. ONE INCH MINIMUM DIAMETER DOWEL BARS SHALL BE USED AND AS APPROVED BY THE CITY ENGINEER. ANY CONFLICTING STRIPING SHALL BE REMOVED BY SANDBLASTING OR OTHER APPROVED METHOD.
25. ALL GRADING AND CONSTRUCTION ACTIVITIES SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECTS SWPPP AND NOI. REFER TO NPDES NOTES ON EROSION CONTROL PLANS. CONSTRUCTION ACTIVITIES SHALL BE LIMITED FROM 7:00 AM TO 6:00 PM MONDAY TO FRIDAY.
26. ALL STREET SECTIONS ARE MINIMUM REQUIREMENTS. ADDITIONAL SOILS TESTS SHALL BE TAKEN AFTER ROUGH GRADING TO DETERMINE THE RECOMMENDED STREET SECTIONS REQUIREMENTS. USE RIVERSIDE COUNTY STD 401 IF EXPANSIVE SOILS ARE ENCOUNTERED.
27. ON-SITE LIGHTING, LANDSCAPE AND ADA LAYOUT TO BE APPROVED BY THE CITY OF PERRIS PLANNING DEPARTMENT.
28. WALLS/FENCE REQUIRE A SEPARATE PERMIT.
29. CONTRACTOR SHALL SUBMIT HAULING ROUTE FOR APPROVAL BY THE CITY ENGINEER PRIOR TO STARTING IMPORTATION/EXPORTATION OF DIRT.
30. VIDEO OF STORM DRAINAGE PIPES SHALL BE SUBMITTED FOR REVIEW BY THE CITY ENGINEER PRIOR TO PAVEMENT CAPPING AND CONCRETING.

GRADING NOTES

GRADING

1. ALL GRADING SHALL CONFORM TO THE 2016 CALIFORNIA BUILDING CODE CHAPTERS 17, 18 & APPENDIX CHAPTER J AS AMENDED BY ORD. 457.
2. ALL PROPERTY CORNERS SHALL BE CLEARLY DELINEATED IN THE FIELD PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION/GRADING.
3. ALL WORK UNDER THIS GRADING PERMIT SHALL BE LIMITED TO WORK WITHIN THE PROPERTY LINES. ALL WORK WITHIN THE ROAD RIGHT-OF-WAY WILL REQUIRE SEPARATE PLANS AND SEPARATE REVIEW. APPROVAL (PERMIT) FROM THE TRANSPORTATION DEPARTMENT.
4. GRADING SHALL BE DONE UNDER THE SUPERVISION OF A SOILS ENGINEER IN CONFORMANCE WITH RECOMMENDATIONS OF THE PRELIMINARY SOILS INVESTIGATION BY NORCAL ENGINEERING DATED FEBRUARY 2, 2016.
5. COMPACTED FILL TO SUPPORT ANY STRUCTURES SHALL COMPLY WITH CBC SECTION 1803.5. PROJECTS WITHOUT PRELIMINARY SOILS REPORTS SHALL HAVE DETAILED SPECIFICATIONS SATISFYING THE REQUIREMENTS IN CBC SECTION 1803.5 PREPARED BY THE ENGINEER ON RECORD.
6. THE CONTRACTOR SHALL NOTIFY THE BUILDING AND SAFETY DEPARTMENT AT LEAST 24 HOURS IN ADVANCE TO REQUEST FINISH LOT GRADE AND DRAINAGE INSPECTION. THIS INSPECTION MUST BE APPROVED PRIOR TO BUILDING PERMIT FINAL INSPECTION FOR EACH LOT.
7. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT, TWO DAYS BEFORE DIGGING AT 1-800-422-4133.

CUT / FILL

8. MAXIMUM CUT AND FILL SLOPE = 2:1.
9. NO FILL SHALL BE PLACED ON EXISTING GROUND UNTIL THE GROUND HAS BEEN CLEARED OF WEEDS, DEBRIS, TOPSOIL AND OTHER DELETERIOUS MATERIAL. FILLS SHOULD BE PLACED IN THIN LIFTS (8-INCH MAX OR AS RECOMMENDED IN SOILS REPORT), COMPACTED AND TESTED AS GRADING PROGRESSES UNTIL FINAL GRADES ARE ATTAINED. ALL FILLS ON SLOPES STEEPER THAN 5 TO 1 (H/V) AND A HEIGHT GREATER THAN 5 FEET SHALL BE KEYED AND BENCHED INTO FIRM NATURAL SOIL FOR FULL SUPPORT. THE BENCH UNDER THE TOE MUST BE 10 FEET WIDE MIN.
10. THE SLOPE STABILITY FOR CUT AND FILL SLOPES OVER 30' IN VERTICAL HEIGHT, OR SLOPES STEEPER THAN 2:1 HAVE BEEN VERIFIED WITH A FACTOR OF SAFETY OF AT LEAST 1.5.
11. NO ROCK OR SIMILAR IRREDUCIBLE MATERIAL WITH A MAXIMUM DIMENSION GREATER THAN 12 INCHES SHALL BE BURIED OR PLACED IN FILLS CLOSER THAN 10 FEET TO THE FINISHED GRADE.

DRAINAGE AND EROSION/ DUST CONTROL

12. DRAINAGE ACROSS THE PROPERTY LINE SHALL NOT EXCEED THAT WHICH EXISTED PRIOR TO GRADING. EXCESS OR CONCENTRATED DRAINAGE SHALL BE CONTAINED ON SITE OR DIRECTED TO AN APPROVED DRAINAGE FACILITY.
13. PROVIDE A SLOPE INTERCEPTOR DRAIN ALONG THE TOP OF CUT SLOPES WHERE THE DRAINAGE PATH IS GREATER THAN 40 FEET TOWARDS THE CUT SLOPE.
14. PROVIDE 5 " WIDE BY 1' HIGH BERM ALONG THE TOP OF ALL FILL SLOPES STEEPER THAN 3:1.
15. THE GROUND IMMEDIATELY ADJACENT TO THE BUILDING FOUNDATION SHALL BE SLOPED AWAY WITH 5% MIN. FOR A MIN. DISTANCE OF 10 HORIZONTAL FEET. SWALES WITHIN 10 FEET FROM BUILDING SHALL HAVE 2% MINIMUM SLOPE.
16. NO OBSTRUCTION OF NATURAL WATER COURSES SHALL BE PERMITTED.
17. DURING ROUGH GRADING OPERATIONS AND PRIOR TO CONSTRUCTION OF PERMANENT DRAINAGE STRUCTURES, TEMPORARY DRAINAGE CONTROL (BEST MANAGEMENT PRACTICES, BMPS) SHALL BE PROVIDED TO PREVENT PONDING WATER AND DAMAGE TO ADJACENT PROPERTIES.
18. DUST SHALL BE CONTROLLED BY WATERING OR OTHER APPROVED METHODS.
19. ALL EXISTING DRAINAGE COURSES ON THE PROJECT SITE MUST CONTINUE TO FUNCTION. PROTECTIVE MEASURES AND TEMPORARY DRAINAGE PROVISIONS MUST BE USED TO PROTECT ADJOINING PROPERTIES DURING GRADING OPERATIONS.
20. FOR SLOPES 3 TO 1 (H/V) OR STEEPER:
    ALL SLOPES EQUAL TO OR GREATER THAN 3 ' IN VERTICAL HEIGHT, ARE REQUIRED TO BE PLANTED WITH GRASS OR ROSEA ICE PLANT (OR EQUAL) GROUND COVER AT A MAXIMUM SPACING OF 12" ON CENTER. SLOPES EXCEEDING 15 ' IN VERTICAL HEIGHT SHALL BE PLANTED WITH APPROVED SHRUBS NOT TO EXCEED 10' ON CENTER, OR TREES SPACED NOT TO EXCEED 20 ' ON CENTER OR SHRUBS NOT TO EXCEED 10 ', OR A COMBINATION OF SHRUBS AND TREES NOT TO EXCEED 15 ' IN ADDITION TO THE GRASS OR GROUND COVER. SLOPES THAT REQUIRE PLANTING SHALL BE PROVIDED WITH AN IN-GROUND IRRIGATION SYSTEM EQUIPPED WITH AN APPROPRIATE BACKFLOW DEVICE PER U.P.C., CHAPTER 10. THE SLOPE PLANTING AND IRRIGATION SYSTEM SHALL BE INSTALLED PRIOR TO PRECISE GRADING FINAL.

COMPLETION OF WORK

21. A REGISTERED CIVIL ENGINEER SHALL PREPARE FINAL COMPACTION REPORT/GRADING REPORT AND IT SHALL BE SUBMITTED FOR REVIEW AND APPROVAL. THE REPORT SHALL ALSO PROVIDE BUILDING FOUNDATION DESIGN PARAMETERS INCLUDING ALLOWABLE SOILS PRESSURES, EXPANSION INDEX AND REMEDIAL MEASURES IF EI>20, WATER SOLUBLE SULFATE CONTENT, CORROSIVITY AND REMEDIAL MEASURES IF NECESSARY.
22. EXCEPT FOR NON-TRACT SINGLE RESIDENTIAL LOT GRADING, THE COMPACTION REPORT SHALL INCLUDE THE SPECIAL INSPECTION VERIFICATIONS LISTED IN TABLE 1704.7 OF 2007 CBC.
23. A REGISTERED CIVIL ENGINEER SHALL SUBMIT TO THE BUILDING AND SAFETY DEPARTMENT WRITTEN CERTIFICATION OF COMPLETION OF GRADING IN ACCORDANCE WITH THE APPROVED GRADING PLAN PRIOR TO REQUESTING INSPECTION AND ISSUANCE OF THE BUILDING PERMIT. CERTIFICATION SHALL INCLUDE LINE GRADE, SURFACE DRAINAGE, ELEVATION, AND LOCATION OF PERMITTED GRADING ON THE LOT.

MISC NOTES

1. FOR ANY GRADING >5000 CY, PRE-GRADING MEETING SHALL BE HELD WITH ATTENDANCE OF PLAN CHECK ENGINEER, CONTRACTOR, SOIL ENGINEER, AND CIVIL ENGINEER AT OWNER'S EXPENSE. ALSO, GRADING CONTRACTOR SHALL SUBMIT PRELIMINARY CONSTRUCTION SCHEDULE PRIOR TO STARTING GRADING WORK AND SUBMIT REVISED CONSTRUCTION SCHEDULE WHENEVER MAJOR CHANGES OCCURS.
2. ALL COLLUVIUM AND ANY UNDOCUMENTED FILL SHOULD BE REMOVED TO A DEPTH WHERE BEDROCK IS EXPOSED. ESTIMATED DEPTHS OF REMOVAL ARE ANTICIPATED TO RANGE FROM APPROXIMATELY 1 TO 7 FEET.

GENERAL NOTES

1. CONTRACTOR SHALL VERIFY ALL EXISTING FIELD CONDITIONS AND NOTIFY DESIGN ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO VERIFY POINTS OF CONNECTION TO PIPES, INLETS, CURBS, GUTTERS, ETC. AND NOTIFY TRUXAW AND ASSOCIATES OF ANY DISCREPANIES PRIOR TO CONSTRUCTION.
3. REFER TO ARCHITECTURAL PLANS FOR BUILDING DIMENSIONS, BUILDING SETBACKS, CONCRETE COLORS AND FINISHES, STRUCTURAL DETAILS, WALKWAYS, EXPANSION JOINT LOCATIONS, UTILITIES, ETC.
4. ALL WORK SHALL BE DONE IN STRICT CONFORMANCE WITH CURRENT CITY OF PERRIS AND SPPWC STANDARDS. WORK SHALL ALSO CONFORM TO APPLICABLE BUILDING CODES (CA BUILDING CODE, CA PLUMBING CODE, ETC.) AS INTERPRETED BY THE CITY OF LA MIRADA. ALL WHEEL CHAIR RAMPS SHALL BE CONSTRUCTED AS PER CURRENT ADA (AMERICANS WITH DISABILITIES ACT) STANDARDS INCLUDING BUT NOT LIMITED TO SLOPE, TRUNCATED DOMES, ETC.
5. ALL CONTRACTORS PERFORMING WORK ON THIS PROJECT SHALL FAMILIARIZE THEMSELVES WITH THE SITE AND SHALL BE SOLELY RESPONSIBLE FOR ANY DAMAGE TO EXISTING FACILITIES RESULTING DIRECTLY OR INDIRECTLY FROM THEIR OPERATIONS, WHETHER OR NOT SHOWN ON THESE PLANS.
6. EXISTING UNDERGROUND UTILITY LINE LOCATIONS WERE TAKEN FROM AVAILABLE RECORDS. OTHER UTILITIES MAY EXIST THAT ARE NOT PLOTTED HEREON.
7. EXISTING UNDERGROUND UTILITIES ARE TO BE RELOCATED BY THE CONTRACTOR AS REQUIRED TO AVOID CONFLICT WITH PROPOSED STRUCTURES. REFER TO PLANS FOR DETAILS.
8. CALL UNDERGROUND SERVICE ALERT FOR UNDERGROUND LOCATIONS 48 HOURS BEFORE YOU DIG. 811.
9. THE CONTRACTOR SHALL RENEW OR REPLACE ANY EXISTING TRAFFIC STRIPING AND/OR PAVEMENT MARKINGS, WHICH DURING HIS OPERATIONS HAVE BEEN EITHER REMOVED OR THE EFFECTIVENESS OF WHICH HAS BEEN REDUCED.
10. THE CONTRACTOR SHALL COMPLY WITH THE SOILS REPORT (AND ADDENDA) FOR THIS PROJECT AND ALL RECOMMENDATIONS FROM THE SOILS ENGINEER. (SEE INFORMATION AT BOTTOM RIGHT)
11. ALL TOPOGRAPHIC AND BOUNDARY INFORMATION SHOWN HEREON WAS OBTAINED FROM AN ALTA/ACSM TITLE SURVEY DATED DECEMBER 6, 2021 BY TRUXAW AND ASSOCIATES, INC.
12. THESE PLANS ARE BASED ON THE SITE PLAN PROVIDED TO TRUXAW AND ASSOCIATES ON 02-10-22.
13. ALL STORM DRAIN AND SEWER PIPE SHALL BE PLACED BEGINNING AT THE DOWNSTREAM POINT OF CONNECTION AND CONTINUING TO THE UPSTREAM TERMINUS. PIPE PLACEMENT SHALL BE CONTINUOUS. DEVIATIONS FROM THIS SEQUENCE WILL NOT BE PERMITTED. POTHOLING INFORMATION, WHERE REQUIRED, SHALL BE OBTAINED AND PROVIDED TO TRUXAW AND ASSOCIATES PRIOR TO CONSTRUCTION.
14. ALL IMPROVEMENTS BEYOND THE LIMITS OF GRADING ARE TO BE PROTECTED IN PLACE UNLESS NOTED OTHERWISE.

* BENCHMARK

COUNTY OF RIVERSIDE BENCHMARK NO. 432

DESCRIBED BY METRO WATER DIST. SO. CALIFORNIA 1992 PERRIS, AT THE SOUTHWEST CORNER OF THE INTERSECTION OF PERRIS BL AND RIDER ST, AT THE BASE OF A STEEL TRAFFIC SIGNAL LIGHT, A 3.5 FOOT (1.1M) BY 2.7 FOOT (0.8M) CONCRETE BASE. A 3-1/4 INCH STANDARD "MWDSC ALUMINUM DISK SET ON EASTSIDE FLUSH.

ELEVATION = 1455.11 FEET (NAVD 88)

* DATUM NOTE

THIS PLAN WAS PREPARED ON COUNTY OF RIVERSIDE DATUM.

* EQUATION

SUBTRACT 2.23' FROM ALL ELEVATIONS HEREON TO EQUAL CITY OF PERRIS BENCHMARK DATUM.

* BASIS OF BEARINGS

THE BEARING OF S 00°27'00" E AS THE EASTERLY LINE OF PARCELS 3 AND 4 PER PARCEL MAP NO. 11104, BOOK 47, PAGE 62 WAS USED AS THE BASIS OF BEARINGS FOR THIS SURVEY.

UTILITY PROVIDERS

SEWER.....EASTERN MUNICIPAL WATER DISTRICT.....(951) 928-3777
STORM DRAIN.....CITY OF PERRIS.....(951) 657-3280
WATER.....EASTERN MUNICIPAL WATER DISTRICT.....(951) 928-3777
ELECTRIC.....SOUTHERN CALIFORNIA EDISON..... (951) 928-8290
CABLE.....CHARTER COMMUNICATIONS.....(951) 406-1666
GAS.....SOUTHERN CALIFORNIA GAS.....(951) 406-1666
TELEPHONE..... FRONTIER COMMUNICATIONS.....(877) 462-6640

FLOOD ZONE

COMMUNITY NUMBER: 060258 1430H, EFFECTIVE DATE: AUGUST 18, 2014
ZONE X; PROPERTY NOT IN A SPECIAL FLOOD HAZARD AREA. AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.
FLOOD INSURANCE IS AVAILABLE, BUT NOT REQUIRED.
INFORMATION OBTAINED FROM CERTIFIED FLOOD SYSTEMS, INC. ON 11/10/2021

* SOURCE OF TOPOGRAPHIC AND BOUNDARY INFORMATION

INFORMATION SHOWN ON THESE PLANS WERE TAKEN FROM THE PLAN REFERENCED BELOW.

DATE OF SURVEY: DECEMBER 6, 2021

ALTA SURVEY BY: TRUXAW AND ASSOCIATES, INC.
1915 W. ORANGEWOOD AVE, SUITE 101
ORANGE, CA 92868
(714) 935-0265
JOB # DED21077

LEGEND

AB = AGGREGATE BASE		TRW = TOP OF RETAINING WALL	
AC = ASPHALT CONCRETE		TW = TOP OF WALL	
BLK = CONCRETE BLOCK		UG = UNDERGROUND	
BS = BACK OF SIDEWALK		UP = UTILITY POLE	
CB = CATCH BASIN		VAR = VARIABLE	
CF = CURB FACE		W = WASHER	
CL = CENTERLINE		WDF = WOOD FENCE	
CLF = CHAIN LINK FENCE		WM = WATER METER	
CO = CLEANOUT		WV = WATER VALVE	
DCV = DETECTOR CHECK VALVE			
DS = ROOF DOWNSPOUT		N. = NORTH	
EG = EDGE OF GUTTER		S. = SOUTH	
EP = EDGE OF PAVEMENT		E. = EAST	
FD = FOUND		W. = WEST	
FDC = FIRE DEPT. CONNECTION		N'LY = NORTHERLY	
FF = FINISHED FLOOR		S'LY = SOUTHERLY	
FG = FINISHED GRADE		E'LY = EASTERLY	
FH = FIRE HYDRANT		W'LY = WESTERLY	
FL = FLOW LINE		N/O = NORTH OF	
FS = FINISHED SURFACE		S/O = SOUTH OF	
GB = GRADE BREAK		E/O = EAST OF	
GM = GAS METER		W/O = WEST OF	
GR = TOP OF GRATE		ℙ = PROPERTY LINE	
GV = GAS VALVE		℄ = CENTERLINE	
HP = HIGH POINT		R/W = RIGHT OF WAY	
HT = HEIGHT		△ = DELTA	
ICV = IRRIGATION CONTROL VALVE		R = RADIUS	
INV = INVERT		L = LENGTH	
IP = IRON PIPE		T = TANGENT	
LS = LIGHT STANDARD		M = MEASURED DATA	
L&T = LEAD & TAG		C = CALCULATED DATA	
MH = MANHOLE		(RAD)= RADIAL BEARING	
NG = NATURAL GROUND		PRO = PROPORTIONATE MEASUREMENT	
N&T = NAIL & TAG		(210.00' R) = RECORD DATA	
OHW = OVERHEAD WIRE		210.00' M. = MEASURED DATA	
PB = PULL BOX		210.00' PRO. = PRORATED DATA	
PCC = CONCRETE		210.00' C. = CALCULATED DATA	
PIV = POST INDICATOR VALVE		(427.00) TC = EXISTING ELEVATION	
PL = PROPERTY LINE		427.00 TC = DESIGN ELEVATION	
RD = ROOF DRAIN		CATV = CABLE TV LINE	
RWH = REDWOOD HEADER		E = ELECTRICAL LINE	
SCB = SIGNAL CONTROL BOX		FW = FIRE WATER LINE	
SMH = SEWER MANHOLE		G = GAS LINE	
SPK = SPIKE		GB = GRADE BREAK LINE	
SW = SIDEWALK		R = RIDGE LINE	
TC = TOP OF CURB		S = SEWER LINE	
TE = TRASH ENCLOSURE		SD = STORM DRAIN LINE	
TP = TELEPHONE POLE		T = TELEPHONE LINE	
TRAN = TRANSITION		W = WATER LINE	
TRANS= TRANSFORMER			

SYMBOLS

FIRE HYDRANT
STREET LIGHT
TRAFFIC SIGNAL
TRAFFIC SIGNAL ARM & POLE
LIGHT STANDARD
UTILITY POLE
GUY WIRE & ANCHOR
WM WATER METER
GM GAS METER
WV WATER VALVE
GV GAS VALVE
PB PULL BOX
GRATE INLET
SIGN
VENT
(S) SEWER MANHOLE
(D) STORM DRAIN MANHOLE
(T) TELEPHONE MANHOLE
(MH) MANHOLE
SEWER CLEANOUT
(W) MONITORING WELL
HANDICAP PARKING STALL
(L) LANDSCAPED AREA
(P) PROTECT IN PLACE
(R) REMOVE AND DISPOSE OFFSITE
(RE) RELOCATE
(3) PLOTABLE EASEMENT ITEM No. PER TITLE REPORT
(427.0) EXIST. CONTOUR
427.0 DESIGN CONTOUR
TREE

SOILS ENGINEER

THESE PLANS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE GEOTECHNICAL RECOMMENDATIONS MADE BY:

SLADDEN ENGINEERING
450 EGAN AVENUE
BEAUMONT, CA 92223
(951) 845-7743
PROJECT No. 644-21082
REPORT DATE: JANUARY 4, 2022

CONTRACTOR SHALL OBTAIN A COPY OF THIS REPORT AND FOLLOW THE RECOMMENDATIONS THEREIN. NOTIFY TRUXAW AND ASSOCIATES OF ANY DISCREPANCIES OR FIELD CHANGES PRIOR TO CONSTRUCTION.

PLAN PREPARED FOR

DEDEAUX PROPERTIES
100 WILSHIRE BOULEVARD, SUITE 250
SANTA MONICA, CA 90401

ARCHITECT

ARCHITECTS ORANGE
144 NORTH ORANGE STREET
ORANGE, CA 92866

THIS PLAN IS:

PRELIMINARY

(NOT FOR CONSTRUCTION)

DIGALERT
DIAL TOLL FREE
1-800-422-4133
ONLINE
WWW.DIGALERT.ORG
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMMENCE UNTIL AND ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS REPSONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

MARK	BY	DATE	REVISIONS	APPR.	DATE

ENGINEER | COUNTY

APPROVED BY:

CONTRACT CITY ENGINEER

DATE

SEAL - ENGINEER
REGISTERED PROFESSIONAL ENGINEER
CRAIG S. DI BIAS
No. 75205
CIVIL
STATE OF CALIFORNIA

JOSEPH C. TRUXAW & ASSOCIATES, INC.
CIVIL ENGINEERS & LAND SURVEYORS
1915 W. ORANGEWOOD AVE, SUITE 101, ORANGE, CA 92868
PH: (714) 935-0265 FAX: (714) 935-0106
WWW.TRUXAW.COM

PREPARED UNDER THE SUPERVISION OF: DESIGNED BY: _____ CHK'ED BY: CDB

R.C.E. NO.: 75205

CRAIG DI BIAS — DATE

BENCHMARK:
ELEV. = 1455.11 (NAVD88)
SEE ABOVE FOR BENCHMARK DESCRIPTION

H:_____ V:_____

CITY OF PERRIS
REDLANDS INDUSTRIAL FACILITY
NW CORNER OF PLACENTIA AVENUE AND REDLANDS AVENUE
STORM DRAIN LINE "H" PLANS
TITLE SHEET

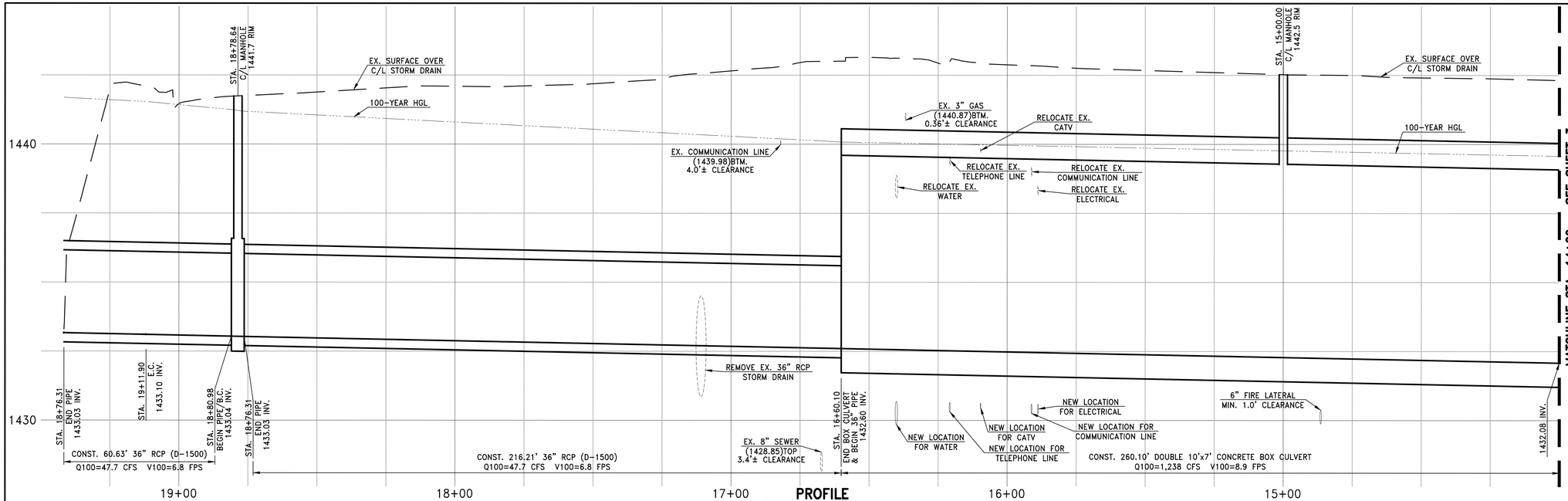
SHEET NO.: 1
OF 4 SHEETS

FOR:

CITY FILE NO.

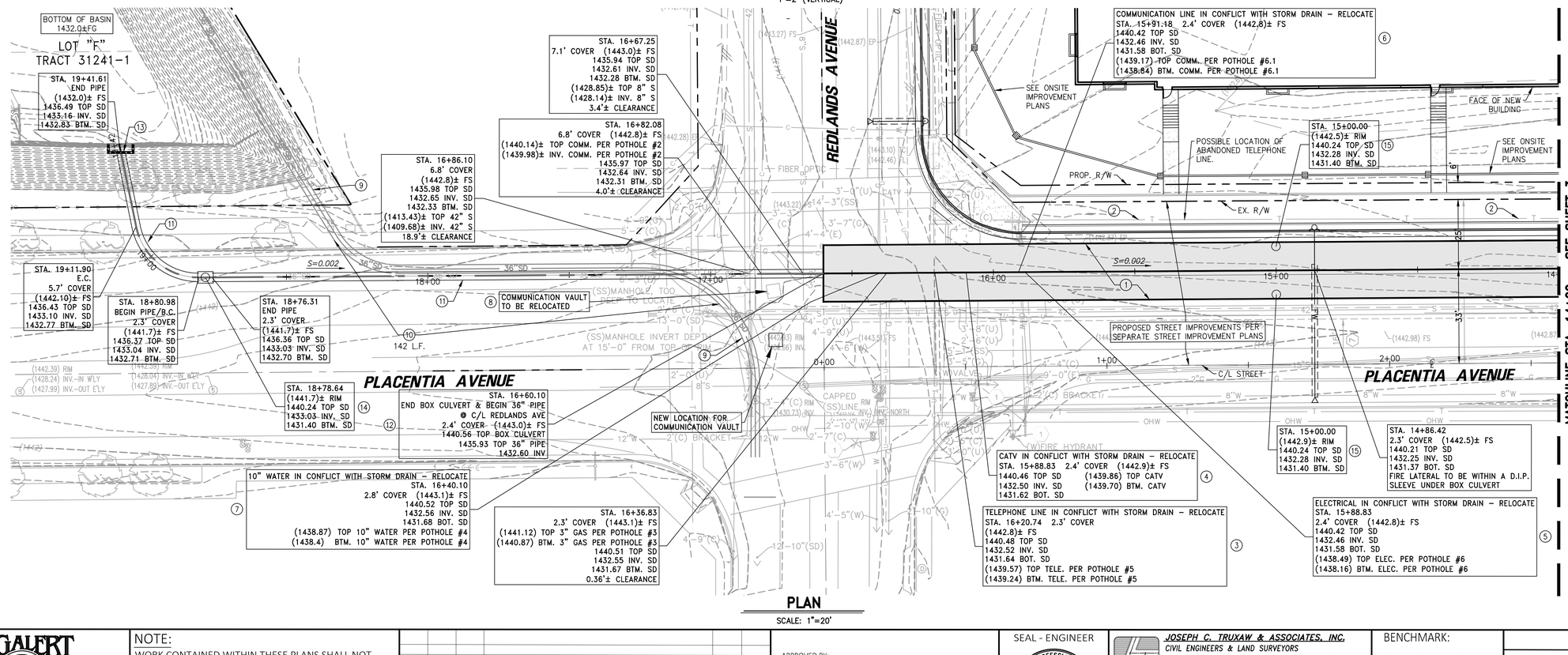
FILE:P:\DED21077\CAD\21077-LINE H.dwg PLOT: 11/21/2022 10:37 AM

CITY OF PERRIS



PROFILE

SCALE: 1"=20' (HORIZONTAL)
1"=2' (VERTICAL)



PLAN

SCALE: 1"=20'

BENCHMARK

COUNTY OF RIVERSIDE BENCHMARK NO. 432

DESCRIBED BY METRO WATER DIST. SO. CALIFORNIA 1992 PERRIS, AT THE SOUTHWEST CORNER OF THE INTERSECTION OF PERRIS BL AND RIDER ST, AT THE BASE OF A STEEL TRAFFIC SIGNAL LIGHT, A 3.5 FOOT (1.1M) BY 2.7 FOOT (0.8M) CONCRETE BASE. A 3-1/4 INCH STANDARD "MWDSC ALUMINUM DISK SET ON EASTSIDE FLUSH.

ELEVATION = 1455.11 FEET (NAVD 88)

DATUM NOTE

THIS PLAN WAS PREPARED ON COUNTY OF RIVERSIDE DATUM.

EQUATION

SUBTRACT 2.23' FROM ALL ELEVATIONS HEREON TO EQUAL CITY OF PERRIS BENCHMARK DATUM.

NOTE:

NO LIGHT POLES OR OTHER STRUCTURES TO BE BUILT OVER LINE H.

NO TREES TO BE PLANTED NEAR LINE H.

CONSTRUCTION NOTES

1. CONSTRUCT 10' WIDE X 7' HIGH REINFORCED CONCRETE DOUBLE BOX CULVERT PER CALTRANS STANDARD PLAN D81 ON SHEET 4.
2. RELOCATE TELEPHONE LINE IF IN CONFLICT WITH STORM DRAIN.
3. RELOCATE PORTION OF TELEPHONE LINE IN CONFLICT WITH STORM DRAIN.
4. RELOCATE PORTION OF CATV LINE IN CONFLICT WITH STORM DRAIN.
5. RELOCATE PORTION OF ELECTRICAL LINE IN CONFLICT WITH STORM DRAIN.
6. RELOCATE PORTION OF COMMUNICATION LINE IN CONFLICT WITH STORM DRAIN.
7. RELOCATE PORTION OF WATER LINE IN CONFLICT WITH STORM DRAIN.
8. RELOCATE COMMUNICATION VAULT.
9. SLURRY EXISTING 36-INCH STORM DRAIN TO ABANDON.
10. REMOVE INTERFERING PORTION OF EXISTING 36-INCH STORM DRAIN.
11. CONSTRUCT 36-INCH REINFORCED CONCRETE PIPE, D-1500.
12. CONSTRUCT JUNCTION STRUCTURE PER S.P.P.W.C. STANDARD PLAN 333-2.
13. CONSTRUCT CONCRETE HEADWALL PER DETAIL ON SHEET 4.
14. CONSTRUCT MANHOLE PER S.P.P.W.C. STANDARD PLAN 320-2.
15. CONSTRUCT MANHOLE PER S.P.P.W.C. STANDARD PLAN 323-2.

LEGEND

10' WIDE X 7' HIGH DOUBLE CONCRETE BOX CULVERTS

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(NOT FOR CONSTRUCTION)

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MARK	BY	DATE	REVISIONS	APPR.	DATE
	ENGINEER			COUNTY	

APPROVED BY:

CONTRACT CITY ENGINEER

DATE

SEAL - ENGINEER

REGISTERED PROFESSIONAL ENGINEER CRAIG S. DI BIAS No. 75205 CIVIL STATE OF CALIFORNIA

JOSEPH C. TRUXAW & ASSOCIATES, INC.
CIVIL ENGINEERS & LAND SURVEYORS
1915 W. ORANGEWOOD AVE, SUITE 101, ORANGE, CA 92868
PH: (714) 935-0265 FAX: (714) 935-0106
WWW.TRUXAW.COM

PREPARED UNDER THE SUPERVISION OF: CRAIG DI BIAS

DESIGNED BY: _____ CHK'ED BY: CDB

R.C.E. NO.: 75205

DATE

BENCHMARK:

ELEV. = 1455.11 (NAVD88)

SEE ABOVE FOR BENCHMARK DESCRIPTION

H: 1"=20' V: 1"=2'

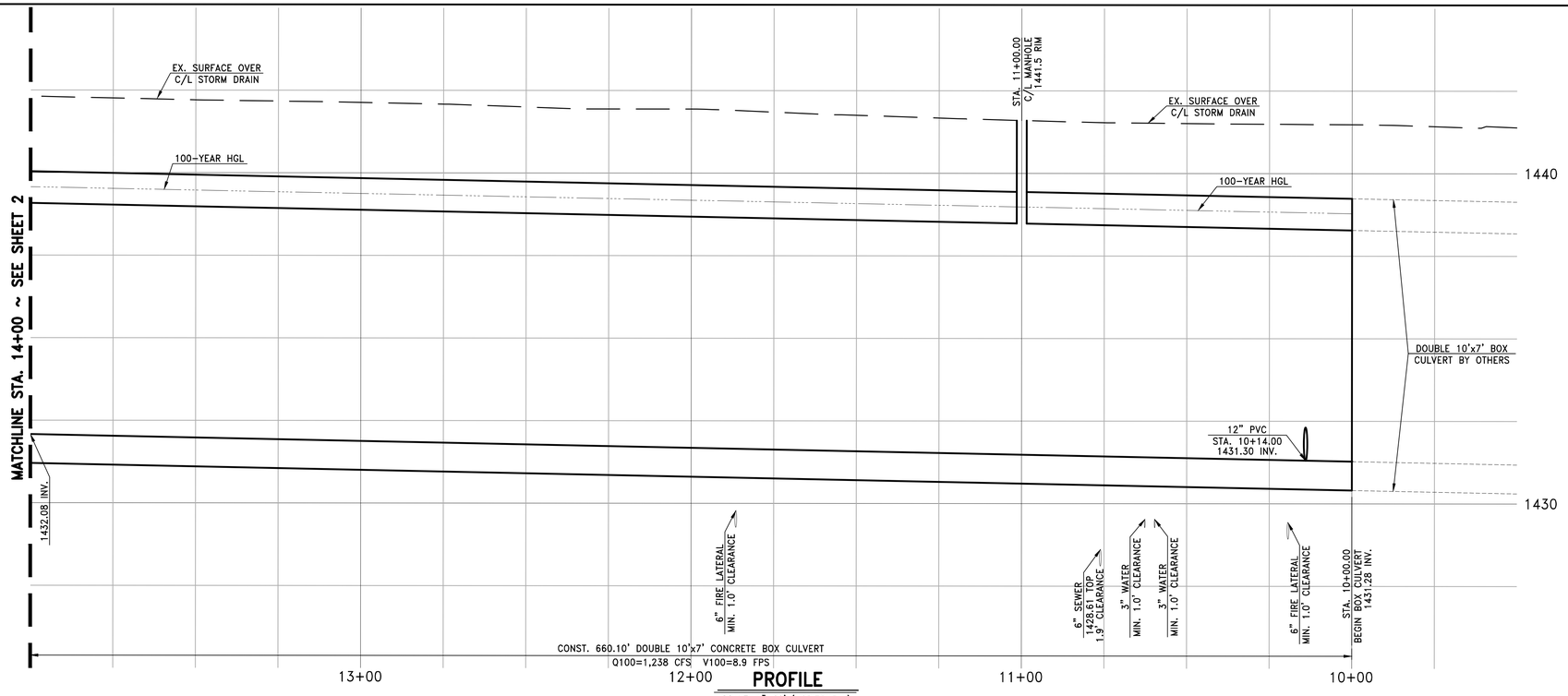
CITY OF PERRIS

REDLANDS INDUSTRIAL FACILITY
NW CORNER OF PLACENTIA AVENUE AND REDLANDS AVENUE
STORM DRAIN LINE "H" PLANS
PLAN AND PROFILE FROM STA. 14+00.00 TO STA. 19+41.61

SHEET NO.: 2 OF 4 SHEETS

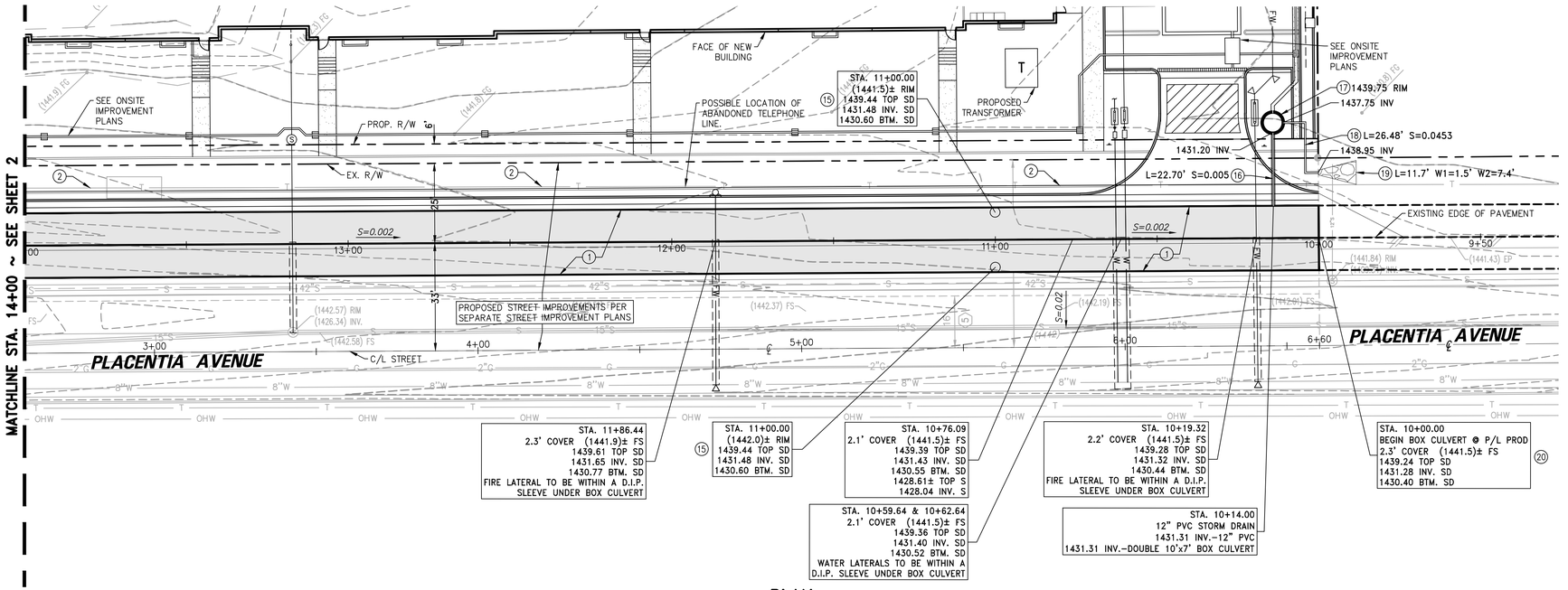
FOR:

CITY FILE NO.



PROFILE

SCALE: 1"=20' (HORIZONTAL)
1"=2' (VERTICAL)



PLAN

SCALE: 1"=20'

BENCHMARK

COUNTY OF RIVERSIDE BENCHMARK NO. 432

DESCRIBED BY METRO WATER DIST. SO. CALIFORNIA 1992 PERRIS, AT THE SOUTHWEST CORNER OF THE INTERSECTION OF PERRIS BL AND RIDER ST, AT THE BASE OF A STEEL TRAFFIC SIGNAL LIGHT, A 3.5 FOOT (1.1M) BY 2.7 FOOT (0.8M) CONCRETE BASE. A 3-1/4 INCH STANDARD "MWDSC ALUMINUM DISK SET ON EASTSIDE FLUSH.

ELEVATION = 1455.11 FEET (NAVD 88)

DATUM NOTE

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SUBTRACT 2.23' FROM ALL ELEVATIONS HEREON TO EQUAL CITY OF PERRIS BENCHMARK DATUM.

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CONSTRUCTION NOTES

1. CONSTRUCT 10' WIDE X 7' HIGH REINFORCED CONCRETE DOUBLE BOX CULVERT PER CALTRANS STANDARD PLAN D81 ON SHEET 4.
2. RELOCATE TELEPHONE LINE IF IN CONFLICT WITH STORM DRAIN.
15. CONSTRUCT MANHOLE PER S.P.P.W.C. STANDARD PLAN 323-2.
16. CONSTRUCT 12" PVC SDR-35 STORM DRAIN.
17. CONSTRUCT 6 FT DIAMETER REINFORCED MANHOLE WITH SUMP PUMP PER DETAIL ON SHEET 4.
18. CONSTRUCT 4" PVC SDR-35 FORCE MAIN.
19. CONSTRUCT RIP RAP PAD, 10" DIAMETER ROCKS, PAD DIMENSION HEREON.
20. CONSTRUCT CONCRETE BULKHEAD AT DOWNSTREAM END OF BOX CULVERT.

LEGEND

10' WIDE X 7' HIGH DOUBLE CONCRETE BOX CULVERTS

20 10 0 20 40 60

SCALE: 1"=20'

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PRELIMINARY

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MARK	BY	DATE	REVISIONS	APPR.	DATE
ENGINEER				COUNTY	

APPROVED BY:

CONTRACT CITY ENGINEER

DATE

SEAL - ENGINEER
REGISTERED PROFESSIONAL ENGINEER
CRAIG S. DI BIAS
No. 75205
CIVIL
STATE OF CALIFORNIA

JOSEPH C. TRUXAW & ASSOCIATES, INC.
CIVIL ENGINEERS & LAND SURVEYORS
1915 W. ORANGEWOOD AVE, SUITE 101, ORANGE, CA 92868
PH: (714) 935-0265 FAX: (714) 935-0106
WWW.TRUXAW.COM

PREPARED UNDER THE SUPERVISION OF: DESIGNED BY: _____ CHK'ED BY: CDB
R.C.E. NO.: 75205
CRAIG DI BIAS DATE

BENCHMARK:
ELEV. = 1455.11 (NAVD88)
SEE ABOVE FOR BENCHMARK DESCRIPTION

H: 1"=20' V: 1"=2'

CITY OF PERRIS
REDLANDS INDUSTRIAL FACILITY
NW CORNER OF PLACENTIA AVENUE AND REDLANDS AVENUE
STORM DRAIN LINE "H" PLANS
PLAN AND PROFILE FROM STA. 10+00.00 TO STA. 14+00.00

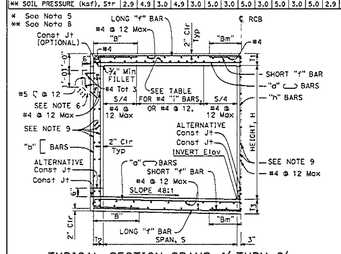
SHEET NO.: 3
OF 4 SHEETS

FOR:
CITY FILE NO.

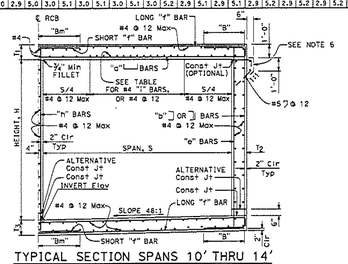
SPAN, S		4'			5'			6'			7'			8'		
HEIGHT, H		2'	3'	4'	2'	3'	4'	2'	3'	4'	2'	3'	4'	2'	3'	4'
MAXIMUM EARTH COVER		10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'
CONC	ROOF T_1	8"	8½"	8"	8½"	8"	8½"	9"	10"	8"	10"	8"	11"	9"	12"	9"	13"	9"	14"	9½"	15"	9½"	16"	9½"	17"	9½"	18"
	WALLS T_2	6"	6½"	6½"	7"	7"	8"	6"	6½"	7½"	7½"	7½"	8"	8"	9½"	6½"	7½"	7½"	8"	8"	9½"	7"	8½"	8"	9½"	8"	11"
	INVERT T_3	7"	9½"	7"	9½"	7"	9½"	7½"	11"	7½"	11"	8"	11"	8"	11"	8½"	12"	8½"	12"	8½"	13"	8½"	13"	8½"	14"	9½"	14"
REINFORCEMENT	"a" SIZE BAR	#4	#4	#4	#4	#4	#4	#5	#4	#5	#4	#5	#4	#5	#4	#5	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
	SPACING	5"	5½"	5"	5½"	5"	5½"	5½"	5½"	5"	5½"	5"	5"	5"	5"	5½"	5"	5"	5"	5"	5"	5½"	5"	5½"	5"	5½"	5"
	"b" SIZE BAR	#4	#4	#4	#4	#5	#4	#4	#4	#4	#4	#5	#4	#5	#4	#4	#4	#5	#4	#5	#5	#5	#4	#5	#5	#5	#5
	SPACING	5½"	6½"	6"	6"	6"	5"	5½"	5½"	5½"	5"	5½"	6"	5"	5"	4½"	5"	5"	5"	6"	5"	5"	5½"	6"	5"	5"	5½"
	"c" SIZE BAR	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
	SPACING	13½"	13½"	13½"	12½"	9½"	9½"	13½"	13½"	13½"	11"	11"	10"	8½"	8"	13½"	11"	9½"	7½"	7"	10½"	8"	8"	6½"	6"	5½"	5½"
	"d" SIZE BAR	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#7	#6	#7	#6	#7	#6	#7	#7	#7	#7	#7	#7	#7	#7	#7	#7
	SPACING	6½"	6½"	6½"	5"	5"	4½"	5"	5"	5"	5"	5"	5"	5"	5"	4½"	5"	5"	5"	5"	5"	5"	5"	5"	5"	5"	5"
	"e" SIZE BAR	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
	SPACING	6"	3½"	3½"	3½"	3½"	3½"	6"	3½"	6"	3½"	5"	5"	3½"	5"	5½"	3½"	5"	5½"	5½"	5½"	3½"	5"	6"	3½"	5"	5½"
	"f" SIZE BAR	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3	#3
	SPACING	4"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"
	"h" SIZE BAR	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
	SPACING	6"	3½"	3½"	3½"	3½"	3½"	6"	3½"	6"	3½"	5"	5"	3½"	5"	5½"	3½"	5"	5½"	5½"	5½"	3½"	5"	6"	3½"	5"	5½"
DUANTITIES	DIM "B" ft-inch	2'-8	2'-6	2'-8	2'-7	2'-10	2'-8	2'-10	2'-9	2'-10	2'-10	2'-10	3'-1	3'-1	3'-0	3'-1	3'-2	3'-1	3'-1	3'-1	3'-3	3'-2	3'-5	3'-3	3'-4	3'-3	3'-4
	DIM "Bm" ft-inch	2'-5	2'-3	2'-5	2'-2	2'-5	2'-3	2'-5	2'-3	2'-5	2'-3	2'-5	2'-5	2'-5	2'-4	2'-5	2'-5	2'-5	2'-5	2'-5	2'-6	2'-5	2'-8	2'-5	2'-8	2'-5	2'-8
	CONCRETE CF/LF	14.9	17.5	16.7	19.5	18.8	22.1	17.4	23.4	19.2	25.8	22.7	28.0	25.0	31.6	22.9	33.3	24.9	35.5	27.7	39.8	30.6	43.3	28.8	41.4	30.6	44.3
	REINFORCEMENT LB/LF	145	131	157	156	205	158	212	169	221	182	224	198	261	215	268	209	287	232	333	244	362	297	327	264	333	276
**	SOIL PRESSURE (ksf), Ser	1.8	3.5	1.9	3.5	1.9	3.5	2.1	3.5	2.2	3.5	2.2	3.6	2.2	3.6	2.2	3.6	2.2	3.6	2.2	3.6	2.2	3.7	2.2	3.6	2.2	3.7
##	SOIL PRESSURE (ksf), Str	2.9	4.4	2.9	4.5	2.9	4.5	2.9	4.5	2.9	4.6	2.9	4.6	2.9	4.6	2.9	4.6	2.9	4.6	2.9	4.6	2.9	4.6	2.9	4.6	2.9	4.6

SPAN, S		10'			12'			14'																			
HEIGHT, H		5'	6'	7'	8'	9'	10'	6'	7'	8'	9'	10'	11'	12'	7'	8'	9'	10'	11'	12'	13'	14'					
MAXIMUM EARTH COVER		10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'	10'	20'
CONC	ROOF T_1	12"	19"	12"	18½"	13½"	18½"	13½"	18½"	13½"	18"	13½"	22"	13½"	22"	13"	22"	13"	21½"	14½"	21½"	14½"	21½"	15½"	25"	16"	25"
	WALLS T_2	8½"	10"	8½"	11½"	10"	12½"	11"	14"	11½"	13½"	13½"	16½"	13½"	17"	11"	14½"	12"	16"	12"	16"	13"	19½"	13"	21"	13"	21"
	INVERT T_3	9½"	14"	9½"	13"	9½"	14"	9½"	13"	11"	14"	9½"	13"	11"	14"	9½"	13"	11"	14"	9½"	13"	11"	15"	9½"	15"	9½"	15"
REINFORCEMENT	"a" SIZE BAR	#5	#5	#5	#5	#5	#5	#5	#5	#5	#6	#5	#6	#5	#6	#5	#6	#5	#6	#5	#6	#5	#6	#5	#6	#5	#6
	SPACING	5"	5"	5"	5"	5"	5"	5"	5"	5"	4½"	5½"	4½"	4½"	5½"	4½"	5½"	4½"	5½"	4½"	5½"	4½"	5"	4½"	5"	4½"	5"
	"b" SIZE BAR	#5	#5	#5	#5	#6	#5	#6	#5	#7	#6	#5	#5	#6	#5	#7	#6	#5	#5	#6	#5	#6	#6	#5	#5	#6	#5
	SPACING	5½"	6"	4½"	5½"	5"	4½"	5½"	4½"	5"	5"	4½"	4½"	5"	4½"	5"	5"	4½"	4½"	5"	4½"	5"	5½"	4½"	4½"	5"	4½"
	"c" SIZE BAR	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
	SPACING	9½"	7½"	9½"	6½"	7½"	9½"	6½"	7½"	9½"	6"	7½"	9½"	6"	7½"	9½"	6"	7½"	9½"	6"	7½"	9½"	6"	7"	9½"	6"	7"
	"d" SIZE BAR	#3	#7	#3	#7	#3	#7	#3	#7	#3	#7	#3	#7	#3	#8	#3	#8	#3	#8	#3	#8	#3	#8	#3	#8	#3	#8
	SPACING W	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	4½"	5"	4½"	5"	4½"	5"	4½"	5"	4½"	5"	4½"	5"	4½"	5"
	"e" SIZE BAR	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
	SPACING	7½"	7½"	10"	8"	10"	8"	10"	8"	10"	7½"	10"	8"	10"	8"	10"	8"	10"	8"	10"	8"	10"	8"	10"	8"	10"	8"
	"f" SIZE BAR	#3	#7	#3	#7	#3	#7	#3	#7	#3	#7	#3	#7	#3	#8	#3	#8	#3	#8	#3	#8	#3	#8	#3	#8	#3	#8
	SPACING	7½"	7½"	10"	8"	10"	8"	10"	8"	10"	7½"	10"	8"	10"	8"	10"	8"	10"	8"	10"	8"	10"	8"	10"	8"	10"	8"
DUANTITIES	DIM "B" ft-inch	6'-3	6'-5	6'-3	6'-3	6'-7	6'-4	6'-7	6'-4	6'-3	6'-10	5'-5	6'-4	6'-10	5'-5	6'-4	6'-10	5'-5	6'-4	6'-10	5'-5	6'-4	6'-10	5'-5	6'-4	6'-10	5'-5
	DIM "Bm" ft-inch	5'-10	4'-9	5'-10	4'-9	5'-10	4'-10	6'-1	4'-11	6'-3	5'-0	5'-7	5'-2	6'-3	5'-9	6'-4	5'-10	6'-4	5'-11	6'-4	6'-0	6'-6	6'-0	6'-6	6'-0	6'-6	6'-0
	CONCRETE CF/LF	51.8	62.4	53.3	66.1	57.3	90.4	61.3	95.3	65.6	102.3	71.2	107.4	69.0	113.0	72.3	118.2	76.3	125.1	79.6	131.4	85.4	134.7	97.1	141.7	132.8	149.4
	REINFORCEMENT LB/LF	614	465	642	491	690	512	727	532	715	557	773	608	733	671	766	692	817	718	898	744	919	764	861	804	921	881
**	SOIL PRESSURE (ksf), Ser	2.2	3.5	2.3	3.5	2.3	3.5	2.3	3.5	2.4	4.0	2.2	4.0	2.3	4.0	2.3	4.0	2.3	4.0	2.3	4.1	2.4	4.1	2.4	4.1	2.3	4.1
##	SOIL PRESSURE (ksf), Str	2.9	4.9	3.0	4.9	3.0	5.0	3.0	5.0	3.0	5.0	3.0	5.0	2.9	5.0	2.9	5.0	3.0	5.1	3.0	5.1	3.0	5.2	2.9	5.1	2.9	5.2

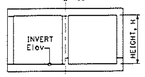
* See Note 5
** See Note 8



TYPICAL SECTION SPANS 4' THRU 8'



TYPICAL SECTION SPANS 10' THRU 14'



FLAT INVERT ALTERNATIVE

NOTES:

1. For boxes with span or height less than any of those shown in table, use next greater size box concrete dimensions and reinforcement. Make necessary changes in bar lengths and quantities.
2. For boxes with span or height or cover greater than those shown in tables, a special design is required.
3. Quantities are approximate and for design purposes only.
4. It is permissible to eliminate the 180° hooks on every other "a" bar.
5. Spacing shown is between long and short "f" bars.
6. Provide paving notch when top is exposed and when pavement is concrete, and adjust quantities.
7. For design and details not shown, see Standard Plan D82.
8. Soil pressures shown are factored per AASHTO LRFD and include soil weight of fill over box, self weight of box, and live load where applicable.
9. Stagger rebars for wall thickness less than 8".

"f" BARS, FOR EARTH COVERS UP TO AND INCLUDING 10'-0"								
SPAN	4'	5'	6'	7'	8'	10'	12'	14'
NUMBER	5	6	8	10	13	14	16	19

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
CAST-IN-PLACE REINFORCED CONCRETE DOUBLE BOX CULVERT
NO SCALE

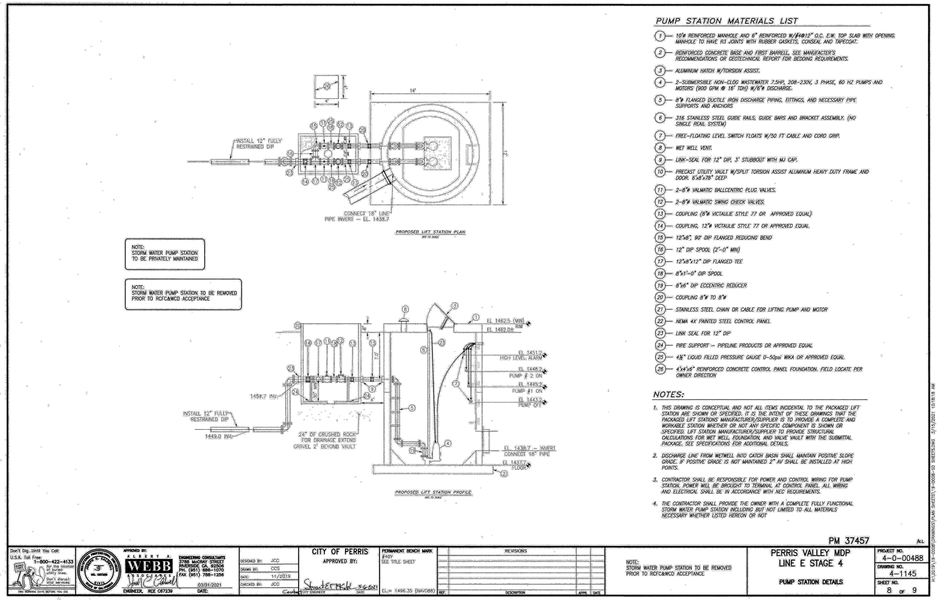
D81

2022 STANDARD PLAN D81

224

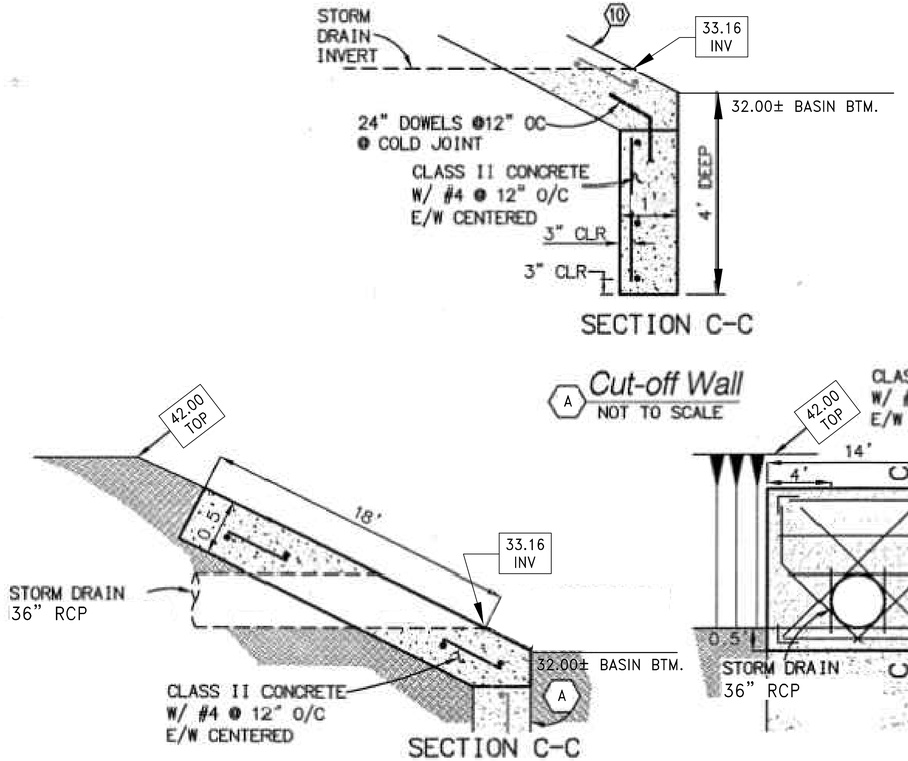
REINFORCED CONCRETE DOUBLE BOX CULVERT DETAIL (1)

NOT TO SCALE



SUMP PUMP DETAIL (17)

NOT TO SCALE



CONCRETE HEADWALL DETAIL (13)

NOT TO SCALE

BENCHMARK
COUNTY OF RIVERSIDE BENCHMARK NO. 432

DESCRIBED BY METRO WATER DIST. SO. CALIFORNIA 1992 PERRIS, AT THE SOUTHWEST CORNER OF THE INTERSECTION OF PERRIS BL AND RIDER ST, AT THE BASE OF A STEEL TRAFFIC SIGNAL LIGHT, A 3.5 FOOT (1.1M) BY 2.7 FOOT (0.8M) CONCRETE BASE. A 3-1/4 INCH STANDARD "MWDSC ALUMINUM DISK SET ON EASTSIDE FLUSH.

ELEVATION = 1455.11 FEET (NAVD 88)

DATUM NOTE
THIS PLAN WAS PREPARED ON COUNTY OF RIVERSIDE DATUM.

EQUATION
SUBTRACT 2.23' FROM ALL ELEVATIONS HEREON TO EQUAL CITY OF PERRIS BENCHMARK DATUM.

THIS PLAN IS:
PRELIMINARY
(NOT FOR CONSTRUCTION)

DIGALERT — DIAL TOLL FREE 1-800-422-4133 ONLINE WWW.DIGALERT.ORG AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA

NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMMENCE UNTIL AND ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS REPSONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTABILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES ARISING AFTER CITY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE CITY.

MARK	BY	DATE	REVISIONS	APPR.	DATE
ENGINEER				COUNTY	

APPROVED BY:
CONTRACT CITY ENGINEER
DATE

SEAL - ENGINEER: REGISTERED PROFESSIONAL ENGINEER, CRAIG S. DI BIAS, No. 75205, CIVIL, STATE OF CALIFORNIA

JOSEPH C. TRUXAW & ASSOCIATES, INC.
CIVIL ENGINEERS & LAND SURVEYORS
1915 W. ORANGEWOOD AVE, SUITE 101, ORANGE, CA 92868
PH: (714) 935-0265 FAX: (714) 935-0106
WWW.TRUXAW.COM

PREPARED UNDER THE SUPERVISION OF: CRAIG DI BIAS
DESIGNED BY: _____ CHK'ED BY: CDB
R.C.E. NO.: 75205
DATE

BENCHMARK:
ELEV. = 1455.11 (NAVD88)
SEE ABOVE FOR BENCHMARK DESCRIPTION
H: N/A V: N/A

CITY OF PERRIS
REDLANDS INDUSTRIAL FACILITY
NW CORNER OF PLACENTIA AVENUE AND REDLANDS AVENUE
STORM DRAIN LINE "H" PLANS
DETAILS

SHEET NO.: 4
OF 4 SHEETS

FOR:
CITY FILE NO.

FILE: P:\DED21077\CAD\21077-LINE H.dwg PLOT: 11/21/2022 11:06 AM

CITY OF PERRIS