DRAINAGE REPORT

FOR

Soldat Office Building Project

TEMESCAL CANYON ROAD

City of Corona

Prepared for:

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INTRODUCTION

PURPOSE

This drainage study has been prepared to support the drainage system design of the proposed **Soldat Office Building Project** at Temescal Canyon Road in the City of Corona, County of Riverside. This report identifies drainage patterns and onsite flow tributary to this subject site and provides evaluation runoff from the site under development. The primary purpose of the calculations is to design storm drain system within the project and to provide hydraulic calculations for the proposed Soldat Office Building Storm Drain system.

The developable land consists of approximately 1.1 Acres. The proposed Soldat Office Building project will consist of a building with 4 stories, a 1st story parking garage and 3 stories of offices with a total gross conditioned space of 24,712 SF. The project provides a total of 96 parking spaces, 43 in the upper parking area and 53 in the lower parking area. **See Figure 1a – Site Plan**

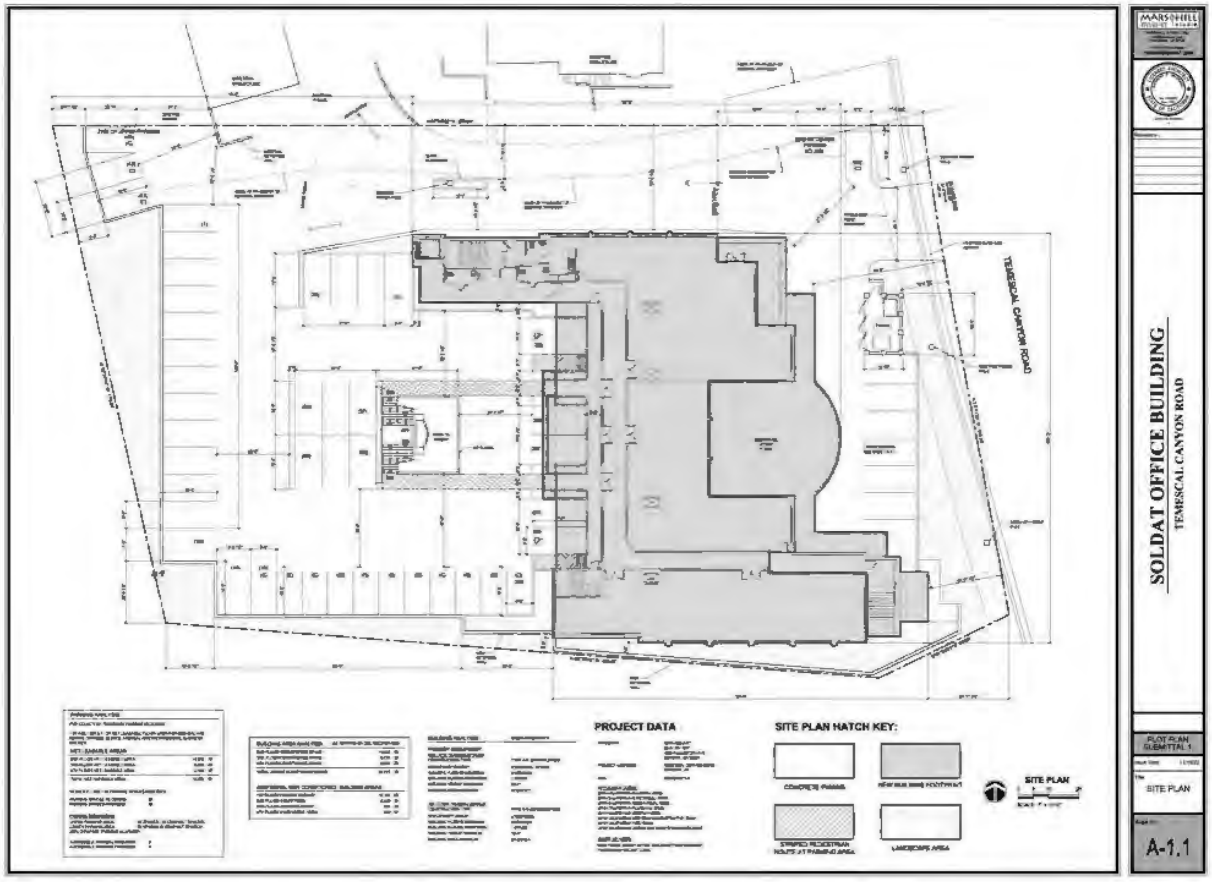


Figure 1a: Site Plan

SETTING

The Soldat Office Building Project is located on the west side of Temescal Canyon Road (APN 282-121-008) between Foster Road and Dial Way in the city of Corona, county of Riverside. The project is bounded on the south by APN 282-121-009, on the north by APN 282-121-007, on the east by Temescal Canyon Road and on the west by Interstate 15. Most of the immediate

surrounding areas are either developed or planned for development. **See Figure 1b – Vicinity/Location Map and Figure 1c – Aerial Map.**

The site ranges in elevation from approximately 919 feet above mean sea level in the far westerly corner of the site to approximately 885 feet above mean sea level at the frontage along Temescal Canyon Road.

With the City of Corona being a co-permitee on the County of Riverside's MS4 permit, certain post development water quality features need to be designed into the project for water quality treatment of daily nuisance flows and first flush storm flows after the project is constructed and operated.

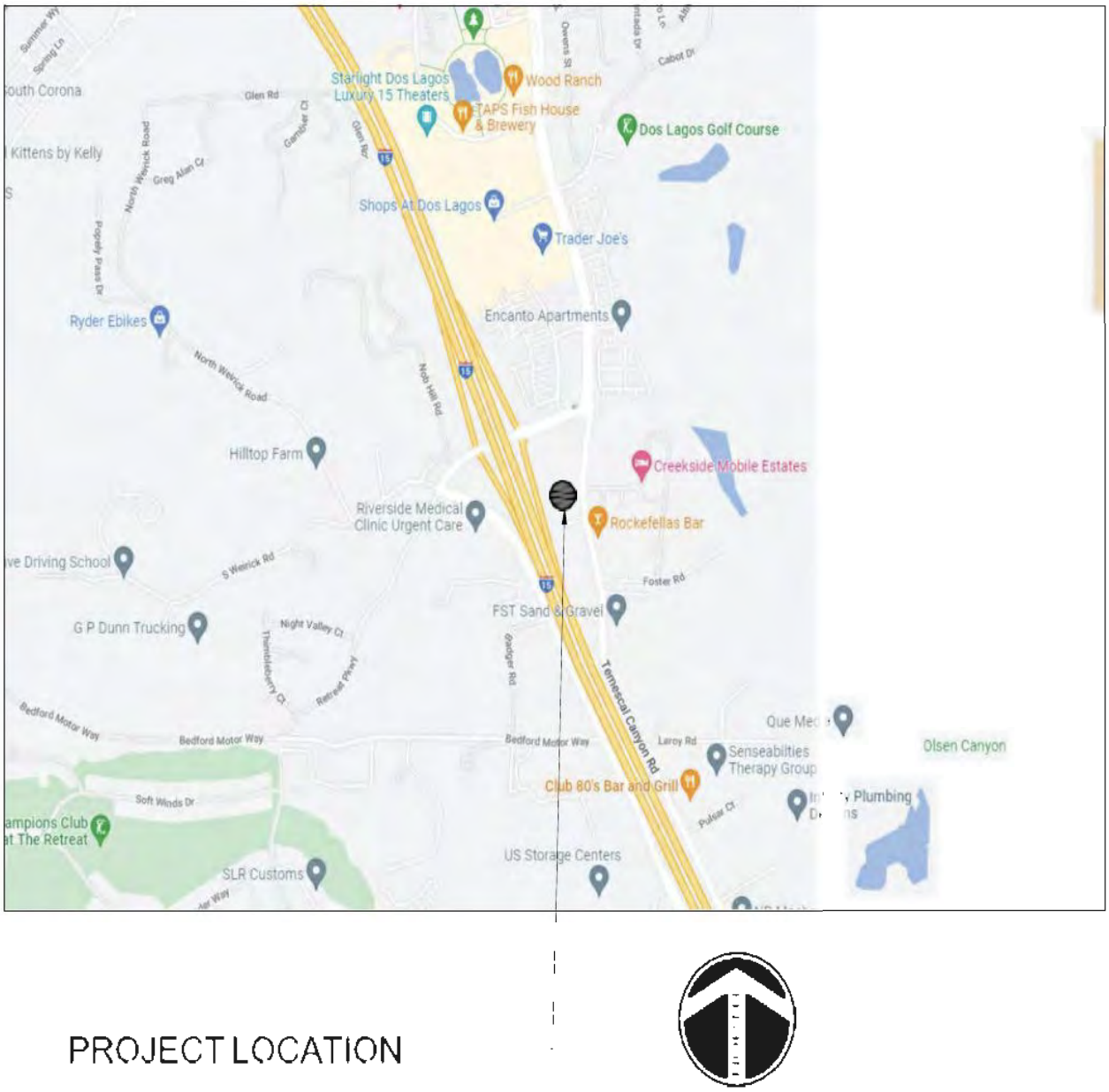


Figure 1b: Vicinity Map

Figure 1c: Aerial Picture
Current Condition

EXISTING CONDITIONS

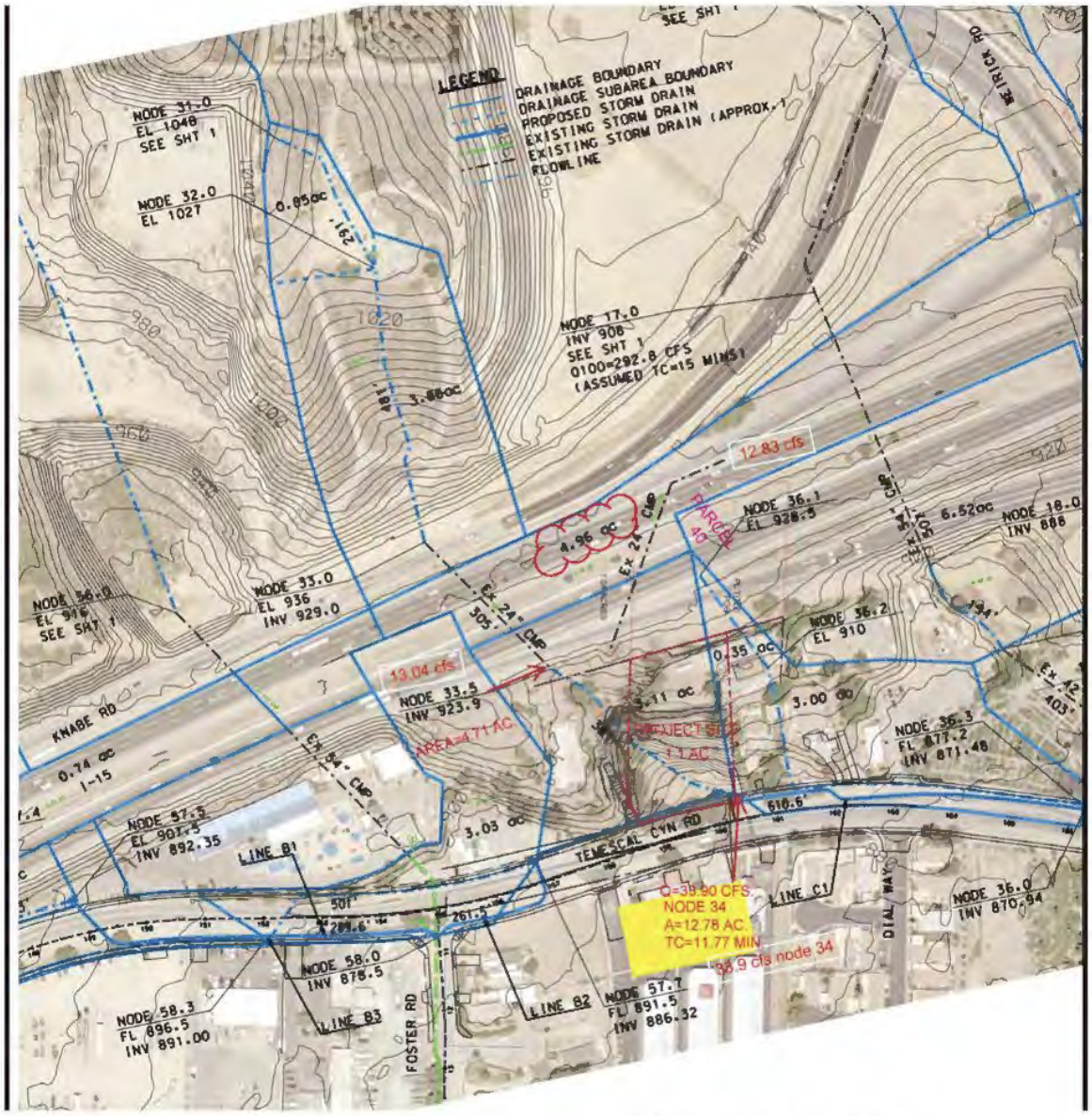
The hydrology of the Soldat Office Building Project Site (APN 282-121-008) has been studied as part of a Hydrology Study supporting the Temescal Canyon Road Widening Project from Leroy Road to Dos Lagos Drive by the Riverside County Transportation Department. (See excerpts from the report in Attachment A)

Hydrology - Existing Condition:

The Hydrology for the widening of Temescal Canyon Road shows two existing 24" CMP conveying water from Interstate15 and west of I-15 (systems 5 and 6) and discharging into Caltrans right-of-

way west of the project site. Downstream of these two pipes the discharges (13.04 cfs. and 12.83 cfs.) follow natural drainage courses within PN 282-121-009 and APN 282-121-008 and adding a sub-area of 3.1 acres before merging (34.0 cfs.) with the gutter flow on Temescal Canyon Road. The project has proposed a drainage inlet in front of these two properties to help intercept the discharge form these two systems 5 and 6. The Hydrologic calculations assumed these two properties are commercial.

See **Results -** for Rational Method Hydrology Calculations (Existing Condition)



HYDROLOGY MAP
PRE-DEVELOP CONDITION
100 YEAR STORM

FIGURE 2a - HYDROLOGY MAP
EXISTING CONDITION

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       31.000 to Point/Station       32.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   291.000(Ft.)
Top (of initial area) elevation =  1048.000(Ft.)
Bottom (of initial area) elevation =  1027.000(Ft.)
Difference in elevation =    21.000(Ft.)
Slope =    0.07216  s(percent)=        7.22
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.855 min.
Rainfall intensity =      3.495(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Initial subarea runoff =      2.533(CFS)
Total initial stream area =        0.850(Ac.)
Pervious area fraction = 0.800


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       32.000 to Point/Station       33.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =  1027.000(Ft.)
End of natural channel elevation =   936.000(Ft.)
Length of natural channel  =   481.000(Ft.)
Estimated mean flow rate at midpoint of channel =      8.284(CFS)

Natural mountain channel type used
L.A. County flood control district formula for channel velocity
 Velocity = 5.48(q^.33)(slope^.492)
Velocity using mean channel flow =   4.85(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.1892
Corrected/adjusted channel slope =  0.1892
Travel time =    1.65 min.      TC =    9.51  min.


 Adding area flow to channel
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.849
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  84.40
Pervious area fraction =  0.800; Impervious fraction =  0.200
Rainfall intensity =      3.208(In/Hr) for a   100.0 year storm
Subarea runoff =     10.507(CFS) for       3.860(Ac.)
Total runoff =     13.040(CFS)  Total area =       4.710(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.000 to Point/Station       33.500
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =   929.000(Ft.)
Downstream point/station elevation =   923.900(Ft.)
Pipe length =   305.00(Ft.)   Manning's N = 0.024
No. of pipes = 1  Required pipe flow =    13.040(CFS)
Given pipe size =    24.00(In.)
Calculated individual pipe flow =   13.040(CFS)
Normal flow depth in pipe =   16.59(In.)
Flow top width inside pipe =   22.17(In.)
Critical Depth =   15.58(In.)
Pipe flow velocity =    5.63(Ft/s)
Travel time through pipe =    0.90 min.
Time of concentration (TC) =   10.41 min.
```

24" PIPE UNDER FREEWAY

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.500 to Point/Station       34.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
Top of natural channel elevation =    923.900(Ft.)
End of natural channel elevation =    883.510(Ft.)
Length of natural channel  =   381.000(Ft.)
Estimated mean flow rate at midpoint of channel =     17.346(CFS)

Natural mountain channel type used
L.A. County flood control district formula for channel velocity:
 Velocity = 5.48(q^.33)(slope^.492)
Velocity using mean channel flow =   4.66(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
        Normal channel slope =  0.1060
Corrected/adjusted channel slope =  0.1060
Travel time =    1.36 min.      TC =   11.77  min.


 Adding area flow to channel
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Rainfall intensity =     2.913(In/Hr) for a   100.0 year storm
Subarea runoff =      8.046(CFS) for       3.110(Ac.)
Total runoff =     21.086(CFS)  Total area =       7.820(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       33.500 to Point/Station       34.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3)  =  74.80
Pervious area fraction =  0.100; Impervious fraction =  0.900
Time of concentration =   11.77 min.
Rainfall intensity =     2.913(In/Hr) for a   100.0 year storm
Subarea runoff =     12.832(CFS) for       4.960(Ac.)
Total runoff =     33.918(CFS)  Total area =      12.780(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station       36.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =    879.000(Ft.)
Downstream point/station elevation =    870.940(Ft.)
Pipe length  =   610.60(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    33.918(CFS)
Given pipe size =     24.00(In.)
NOTE: Normal flow is pressure flow in user selected pipe size.
The approximate hydraulic grade line above the pipe invert is
     8.376(Ft.)  at the headworks or inlet of the pipe(s)
 Pipe friction loss =      13.721(Ft.)
 Minor friction loss =      2.715(Ft.)  K-factor =  1.50
Pipe flow velocity =     10.80(Ft/s)
Travel time through pipe =    0.94 min.
Time of concentration (TC) =    12.71 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       34.000 to Point/Station       36.000
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Runoff Coefficient = 0.888
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 3) = 74.80
Pervious area fraction = 0.100; Impervious fraction = 0.900
Time of concentration = 12.71 min.
Rainfall intensity = 2.814(In/Hr) for a 100.0 year storm
Subarea runoff = 8.368(CFS) for 3.350(Ac.)
Total runoff = 42.286(CFS) Total area = 16.130(Ac.)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station 36.000 to Point/Station 20.000
**** PIPEFLOW TRAVEL TIME (User specified size) ****
------------------------------------------------------------------------------
Upstream point/station elevation = 870.940(Ft.)
Downstream point/station elevation = 866.780(Ft.)
Pipe length = 84.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 42.286(CFS)
Given pipe size = 24.00(In.)
Calculated individual pipe flow = 42.286(CFS)
Normal flow depth in pipe = 16.85(In.)
Flow top width inside pipe = 21.95(In.)
Critical depth could not be calculated.
Pipe flow velocity = 17.96(Ft/s)
Travel time through pipe = 0.08 min.
Time of concentration (TC) = 12.79 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station 36.000 to Point/Station 20.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area = 16.130(Ac.)
Runoff from this stream = 42.286(CFS)
Time of concentration = 12.79 min.
Rainfall intensity = 2.806(In/Hr)
Summary of stream data:

Stream  Flow rate   TC          Rainfall Intensity
 No.     (CFS)     (min)           (In/Hr)

1      311.492     16.21            2.523
2       42.286     12.79            2.806
Largest stream flow has longer time of concentration
Qp = 311.492 + sum of
        Qb          Ia/Ib
      42.286 *    0.899 =    38.011
Qp =  349.503

Total of 2 streams to confluence:
Flow rates before confluence point:
    311.492     42.286
Area of streams before confluence:
    114.820     16.130
Results of confluence:
Total flow rate = 349.503(CFS)
Time of concentration = 16.212 min.
Effective stream area after confluence = 130.950(Ac.)

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Process from Point/Station 57.100 to Point/Station 57.200
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
Initial area flow distance = 166.000(Ft.)
Top (of initial area) elevation = 996.000(Ft.)
Bottom (of initial area) elevation = 978.000(Ft.)
Difference in elevation = 18.000(Ft.)
Slope = 0.10843 s(percent)= 10.84
TC = k(0.480)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.784 min.
Rainfall intensity = 4.011(In/Hr) for a 100.0 year storm
SINGLE FAMILY (1 Acre Lot)
Runoff Coefficient = 0.858
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
```
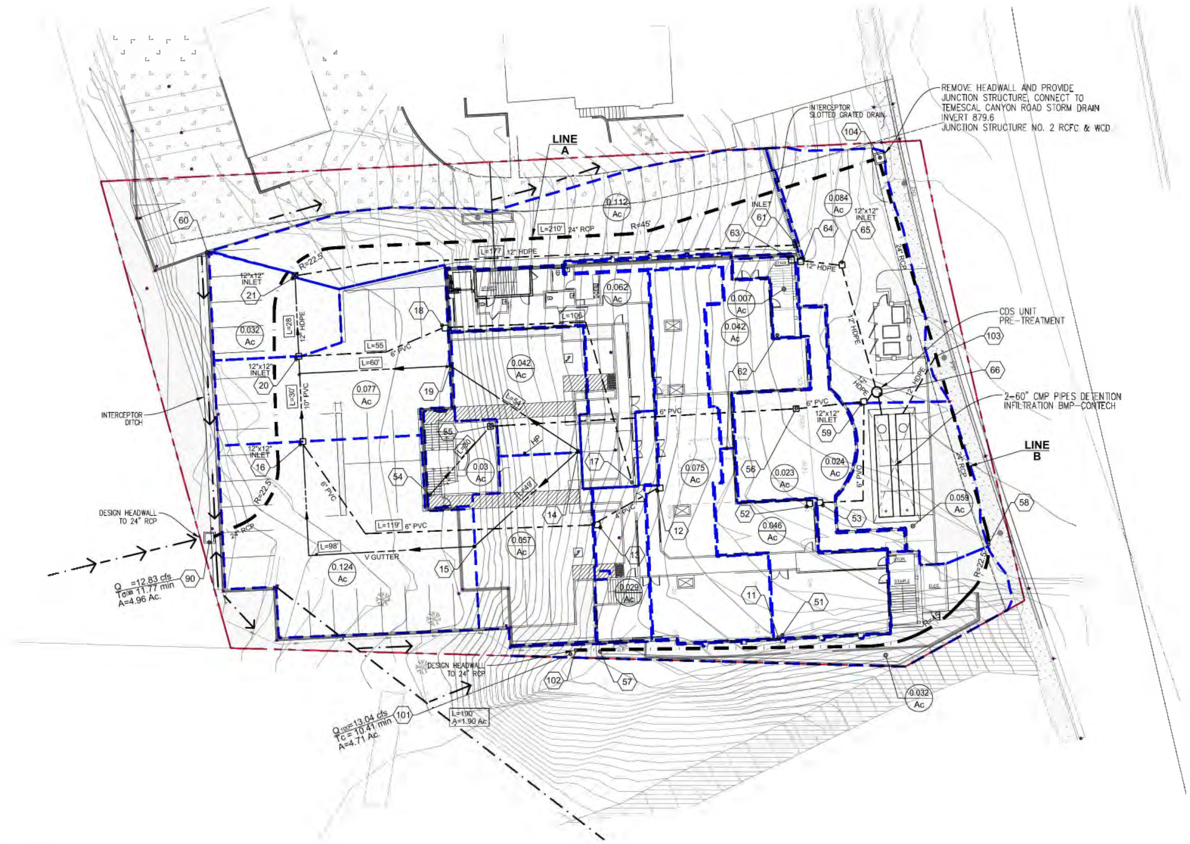

Hydrology - Proposed Condition:

The Project is providing two pipes to intercept the discharges from systems 5 and 6 and running them thru the proposed development. The on-site runoff from the project is conveyed to the front of the project where it will be intercepted by an underground biofiltration BMP before it is discharge into one of the proposed pipes that is picking up the offsite discharges and continues to the north east corner of the project where it will confluence with the other pipe before connecting to the existing storm drain in Temescal Canyon Road.

See **below** for Rational Method Hydrology Calculations (Existing & Proposed Conditions).



LEGEND:

(dashed blue line)	(MAIN) TRIBUTARY AREA BOUNDARY
(dash-dot line with arrow)	FLOWLINES
0.124 Ac	TRIBUTARY AREA, Ac
100	NODE NUMBERS
L=900'	FLOW LENGTH FROM NODE TO NODE WITHIN SUB-AREA
(dash-dot arrow)	DIRECTION OF FLOW

GRAPHIC SCALE 1" = 20'

FIGURE 2b

PRELIMINARY HYDROLOGY MAP

PROPOSED CONDITION

SOLDAT COMMERCIAL BUILDING

TEMESCAL CANYON ROAD

CORONA, CA

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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 1542

                              Analysis prepared by:
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```
 ************************** DESCRIPTION OF STUDY **************************
* TEMESCAL 100 YEAR HYDROLOGY - DEVELOPED CONDITION                       *
*                                                                         *
*                                                                         *
 *************************************************************************

  FILE NAME: DEV.DAT
  TIME/DATE OF STUDY: 14:35 12/27/2022
------------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  2-YEAR, 1-HOUR PRECIPITATION(INCH) = 0.600
  100-YEAR, 1-HOUR PRECIPITATION(INCH) = 1.400
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT = 100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.400
  SLOPE OF INTENSITY DURATION CURVE = 0.4500
  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     11.00 TO NODE     12.00 IS CODE = 22
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  USER SPECIFIED Tc(MIN.) =    5.000
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.283
*USER SPECIFIED(SUBAREA):
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9900
SUBAREA RUNOFF(CFS) =      0.32
TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE = 41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT) <<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   918.00 DOWNSTREAM(FEET) =   917.80
FLOW LENGTH(FEET) =    26.00   MANNING'S N = 0.013
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   3.64
PIPE FLOW VELOCITY = (TOTAL FLOW)/ (PIPE CROSS SECTION AREA)
GIVEN PIPE DIAMETER(INCH) =   4.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       0.32
PIPE TRAVEL TIME(MIN.) =   0.12    Tc (MIN.) =    5.12
LONGEST FLOWPATH FROM NODE     11.00 TO NODE     13.00 =      26.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE = 81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.238
*USER SPECIFIED(SUBAREA):
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9900
SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.12
TOTAL AREA(ACRES) =       0.1   TOTAL RUNOFF(CFS) =       0.44
TC(MIN.) =    5.12

****************************************************************************
FLOW PROCESS FROM NODE     13.00 TO NODE     16.00 IS CODE = 31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   904.50 DOWNSTREAM(FEET) =   903.60
FLOW LENGTH(FEET) =   119.00   MANNING'S N = 0.013
DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   2.64
ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       0.44
PIPE TRAVEL TIME(MIN.) =   0.75    Tc (MIN.) =    5.87
LONGEST FLOWPATH FROM NODE     11.00 TO NODE     16.00 =     145.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE = 81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.985
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8813
SOIL CLASSIFICATION IS "B"
SUBAREA AREA(ACRES) =    0.12   SUBAREA RUNOFF(CFS) =    0.44
TOTAL AREA(ACRES) =       0.2   TOTAL RUNOFF(CFS) =       0.88
TC(MIN.) =    5.87
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE = 10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 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) =    49.00
  UPSTREAM ELEVATION(FEET) =    908.30
  DOWNSTREAM ELEVATION(FEET) =    907.50
  ELEVATION DIFFERENCE(FEET) =      0.80
  TC = 0.303*[(49.00**3)/(     0.80)]**.2 =    3.274
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.283
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8823
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      0.22
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.22

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE = 92
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    907.50
  DOWNSTREAM NODE ELEVATION(FEET) =    906.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   119.00
  "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) = 0.125
  PAVEMENT LIP(FEET) = 0.010   MANNING'S N = .0130
  PAVEMENT CROSSFALL (DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) =   0.14
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.914
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8810
  SOIL CLASSIFICATION IS "B"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.79
  AVERAGE FLOW DEPTH(FEET) =   0.14   FLOOD WIDTH(FEET) =    3.69
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.11   Tc (MIN.) =    6.11
  SUBAREA AREA(ACRES) =    0.12       SUBAREA RUNOFF(CFS) =    0.43
  TOTAL AREA(ACRES) =       0.2         PEAK FLOW RATE(CFS) =       0.64
  ** PIPE SIZED TO MAXIMIZE V-GUTTER FLOW AT DOWNSTREAM NODE **
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.23
  PIPE-FLOW(CFS) =       0.22
  PIPEFLOW TRAVEL TIME(MIN.) =   0.89    Tc (MIN.) =   5.89
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.979
  SUBAREA AREA(ACRES) =    0.12      SUBAREA RUNOFF(CFS) =    0.43
  TOTAL AREA(ACRES) =       0.2        PEAK FLOW RATE(CFS) =       0.65
  *NOTE: V-GUTTER CAPACITY MAY BE EXCEEDED*
  V-GUTTER HYDRAULICS BASED ON MAINLINE Tc:
  V-GUTTER HYDRAULICS COMPUTED USING ESTIMATED FLOW(CFS) =    0.43
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 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) = 0.14   FLOOD WIDTH(FEET) =    3.69
 FLOW VELOCITY(FEET/SEC.) =   1.81   DEPTH*VELOCITY(FT*FT/SEC) =   0.26
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE     16.00 =     168.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE = 11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAINSTREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY     AREA
 NUMBER     (CFS)     (MIN.)      (INCH/HOUR)    (ACRE)
    1         0.65     6.11        3.914         0.18
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE     16.00 =     168.00 FEET.

 ** MEMORY BANK # 1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY     AREA
 NUMBER      (CFS)      MIN.)    INCH/HOUR)    (ACRE)
    1         0.88     5.87        3.985         0.23
 LONGEST FLOWPATH FROM NODE     11.00 TO NODE     16.00 =     145.00 FEET.

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

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER    (CFS)      (MIN.)    (INCH/HOUR)
    1        1.50       5.87         3.985
    2        1.51       6.11         3.914

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       1.50   Tc (MIN.) =    5.87
 TOTAL AREA(ACRES) =        0.4

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     20.00 IS CODE = 31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   903.60 DOWNSTREAM(FEET) =   903.00
 FLOW LENGTH(FEET) =    30.00   MANNING'S N = 0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.28
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.50
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc (MIN.) =    5.97
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE     20.00 =     198.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE = 10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     19.00 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) =    54.00
 UPSTREAM ELEVATION(FEET) =    908.30
 DOWNSTREAM ELEVATION(FEET) =    907.50
 ELEVATION DIFFERENCE(FEET) =      0.80
 TC = 0.303*[(  54.00**3)/(     0.80)]**.2 =    3.471
 COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.283
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8823
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      0.16
 TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE = 92
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    907.50
 DOWNSTREAM NODE ELEVATION(FEET) =    906.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =    60.00
 "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) = 0.120
 PAVEMENT LIP(FEET) = 0.010   MANNING'S N = .0150
 PAVEMENT CROSSFALL (DECIMAL NOTATION) = 0.02000
 MAXIMUM DEPTH(FEET) =   0.14
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.115
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8817
 SOIL CLASSIFICATION IS "B"
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.30
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.14
 AVERAGE FLOW DEPTH(FEET) =   0.12   FLOOD WIDTH(FEET) =    3.00
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.47   Tc (MIN.) =    5.47
 SUBAREA AREA(ACRES) =    0.08       SUBAREA RUNOFF(CFS) =    0.28
 TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.44

        NOTE:TRAVEL TIME ESTIMATES BASED ON NORMAL
        DEPTH EQUAL TO [GUTTER-HIKE + PAVEMENT LIP]

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) = 0.13   FLOOD WIDTH(FEET) =    3.00
 FLOW VELOCITY(FEET/SEC.) =   2.36   DEPTH*VELOCITY(FT*FT/SEC) =   0.31
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE     20.00 =     114.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE = 11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAINSTREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY     AREA
 NUMBER     (CFS)     (MIN.)    (INCH/HOUR)  (ACRE)
```

```
     1        0.44     5.47       4.115        0.12
  LONGEST FLOWPATH FROM NODE     14.00 TO NODE     20.00 =     114.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF       Tc       INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
     1        1.50     5.97       3.956        0.41
  LONGEST FLOWPATH FROM NODE     14.00 TO NODE     20.00 =     198.00 FEET.

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

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)     (MIN.)    (INCH/HOUR)
     1       1.81       5.47        4.115
     2       1.92       5.97        3.956

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.92   Tc(MIN.) =    5.97
  TOTAL AREA(ACRES) =        0.5

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE = 10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 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) =   106.00
  UPSTREAM ELEVATION(FEET) =    920.50
  DOWNSTREAM ELEVATION(FEET) =    920.00
  ELEVATION DIFFERENCE(FEET) =      0.50
  TC = 0.303*[(106.00**3)/(     0.50)]**.2 =    5.714
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.033
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9900
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   903.50  DOWNSTREAM(FEET) =   903.00
  FLOW LENGTH(FEET) =    55.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.51
```

```
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.25
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =    6.08
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     20.00 =     161.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY     AREA
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
     1        0.25      6.08        3.922        0.06
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     20.00 =     161.00 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY     AREA
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
     1        1.92      5.97        3.956        0.53
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE     20.00 =     198.00 FEET.

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

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER     (CFS)     (MIN.)    (INCH/HOUR)
     1       2.16       5.97        3.956
     2       2.15       6.08        3.922

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       2.16   Tc(MIN.) =    5.97
 TOTAL AREA(ACRES) =        0.6

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   903.00  DOWNSTREAM(FEET) =   902.50
 FLOW LENGTH(FEET) =    28.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.56
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.16
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    6.05
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE     21.00 =     226.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.931
```

```
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8811
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.03   SUBAREA RUNOFF(CFS) =    0.11
  TOTAL AREA(ACRES) =       0.6   TOTAL RUNOFF(CFS) =       2.27
  TC(MIN.) =    6.05

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   902.50  DOWNSTREAM(FEET) =   883.00
  FLOW LENGTH(FEET) =   177.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.16
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.27
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =     6.31
  LONGEST FLOWPATH FROM NODE     14.00 TO NODE     61.00 =     403.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     61.00 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) =   206.00
  UPSTREAM ELEVATION(FEET) =    907.00
  DOWNSTREAM ELEVATION(FEET) =    886.00
  ELEVATION DIFFERENCE(FEET) =     21.00
  TC = 0.303*[(  206.00**3)/(    21.00)]**.2 =    4.031
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.283
```

```
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8823
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
      1        0.42      5.00        4.283        0.11
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     61.00 =     206.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
      1        2.27      6.31        3.856        0.62
  LONGEST FLOWPATH FROM NODE     14.00 TO NODE     61.00 =     403.00 FEET.

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

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)      (MIN.)    (INCH/HOUR)
      1       2.22       5.00        4.283
      2       2.66       6.31        3.856

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.66   Tc(MIN.) =     6.31
  TOTAL AREA(ACRES) =        0.7

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     64.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   883.00  DOWNSTREAM(FEET) =   882.90
  FLOW LENGTH(FEET) =     7.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.37
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.66
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =     6.34
  LONGEST FLOWPATH FROM NODE     14.00 TO NODE     64.00 =     410.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     64.00 TO NODE     64.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     62.00 TO NODE     63.00 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) =    72.00
  UPSTREAM ELEVATION(FEET) =    920.50
  DOWNSTREAM ELEVATION(FEET) =    920.00
  ELEVATION DIFFERENCE(FEET) =      0.50
  TC = 0.303*[(   72.00**3)/(     0.50)]**.2 =    4.531
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.283
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8823
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
 FLOW PROCESS FROM NODE     63.00 TO NODE     64.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   883.00  DOWNSTREAM(FEET) =   882.90
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.93
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.16
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    5.03
  LONGEST FLOWPATH FROM NODE     62.00 TO NODE     64.00 =      77.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     64.00 TO NODE     64.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER       (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
      1         0.16     5.03        4.272        0.04
  LONGEST FLOWPATH FROM NODE     62.00 TO NODE     64.00 =      77.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER       (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
      1         2.66     6.34        3.850        0.73
  LONGEST FLOWPATH FROM NODE     14.00 TO NODE     64.00 =     410.00 FEET.

 ****************************WARNING*************************************
```

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

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       2.27       5.03        4.272
      2       2.80       6.34        3.850

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.80   Tc(MIN.) =    6.34
  TOTAL AREA(ACRES) =        0.8

****************************************************************************
  FLOW PROCESS FROM NODE     64.00 TO NODE     65.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   882.90  DOWNSTREAM(FEET) =   882.75
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.70
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.80
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    6.39
  LONGEST FLOWPATH FROM NODE     14.00 TO NODE     65.00 =     425.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     65.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.836
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8807
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.08   SUBAREA RUNOFF(CFS) =    0.28
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       3.08
  TC(MIN.) =    6.39

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     66.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   882.75  DOWNSTREAM(FEET) =   882.50
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.75
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.08
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    6.48
  LONGEST FLOWPATH FROM NODE     14.00 TO NODE     66.00 =     450.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     66.00 TO NODE     66.00 IS CODE =  10
----------------------------------------------------------------------------
```

```
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
================================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     66.00 TO NODE     66.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 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) =    30.00
  UPSTREAM ELEVATION(FEET) =    886.30
  DOWNSTREAM ELEVATION(FEET) =    886.00
  ELEVATION DIFFERENCE(FEET) =      0.30
  TC = 0.303*[(   30.00**3)/(     0.30)]**.2 =    2.968
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.283
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9900
  SUBAREA RUNOFF(CFS) =      0.13
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.13

****************************************************************************
 FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   883.50  DOWNSTREAM(FEET) =   882.90
  FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.71
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.13
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =    6.08
  LONGEST FLOWPATH FROM NODE     54.00 TO NODE     56.00 =     140.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.924
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8810
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.02   SUBAREA RUNOFF(CFS) =    0.08
  TOTAL AREA(ACRES) =      0.1   TOTAL RUNOFF(CFS) =      0.21
  TC(MIN.) =    6.08

****************************************************************************
 FLOW PROCESS FROM NODE     56.00 TO NODE     59.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   882.90  DOWNSTREAM(FEET) =   882.70
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.48
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.21
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    6.21
  LONGEST FLOWPATH FROM NODE     54.00 TO NODE     59.00 =     160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 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) =    48.00
  UPSTREAM ELEVATION(FEET) =    920.50
  DOWNSTREAM ELEVATION(FEET) =    920.00
  ELEVATION DIFFERENCE(FEET) =      0.50
  TC = 0.303*[(   48.00**3)/(     0.50)]**.2 =    3.553
  COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.283
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9900
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   883.40  DOWNSTREAM(FEET) =   883.30
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.14
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.20
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    5.03
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =      53.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     53.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.273
  *USER SPECIFIED(SUBAREA):
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .9900
```

```
  SUBAREA AREA(ACRES) =     0.02   SUBAREA RUNOFF(CFS) =     0.10
  TOTAL AREA(ACRES) =        0.1   TOTAL RUNOFF(CFS) =       0.30
  TC(MIN.) =    5.03

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     59.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   883.30  DOWNSTREAM(FEET) =   882.70
  FLOW LENGTH(FEET) =    53.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.88
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.30
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =     5.33
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     59.00 =     106.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF       Tc       INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
     1         0.30      5.33        4.160        0.07
  LONGEST FLOWPATH FROM NODE     51.00 TO NODE     59.00 =     106.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF       Tc       INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
     1         0.21      6.21        3.885        0.05
  LONGEST FLOWPATH FROM NODE     54.00 TO NODE     59.00 =     160.00 FEET.

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

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)     (MIN.)    (INCH/HOUR)
     1        0.47       5.33        4.160
     2        0.48       6.21        3.885

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       0.47   Tc(MIN.) =     5.33
  TOTAL AREA(ACRES) =        0.1

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

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

```
 FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 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) =   155.00
  UPSTREAM ELEVATION(FEET) =    888.00
  DOWNSTREAM ELEVATION(FEET) =    886.50
  ELEVATION DIFFERENCE(FEET) =      1.50
  TC = 0.303*[(  155.00**3)/(     1.50)]**.2 =    5.762
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.018
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8814
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      0.11
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.11

****************************************************************************
 FLOW PROCESS FROM NODE     58.00 TO NODE     59.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.018
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8814
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.06   SUBAREA RUNOFF(CFS) =    0.21
  TOTAL AREA(ACRES) =       0.1   TOTAL RUNOFF(CFS) =       0.32
  TC(MIN.) =    5.76

****************************************************************************
 FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER       (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
      1         0.32     5.76       4.018        0.09
  LONGEST FLOWPATH FROM NODE     57.00 TO NODE     59.00 =     155.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER       (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
      1         0.47     5.33       4.160        0.12
  LONGEST FLOWPATH FROM NODE     54.00 TO NODE     59.00 =     160.00 FEET.

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

```
 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER     (CFS)     (MIN.)    (INCH/HOUR)
     1       0.77       5.33         4.160
     2       0.78       5.76         4.018

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       0.77   Tc(MIN.) =    5.33
 TOTAL AREA(ACRES) =        0.2

****************************************************************************
 FLOW PROCESS FROM NODE     59.00 TO NODE     66.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   882.70  DOWNSTREAM(FEET) =   882.50
 FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.33
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.77
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    5.44
 LONGEST FLOWPATH FROM NODE     54.00 TO NODE     66.00 =     182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     66.00 TO NODE     66.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY     AREA
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
     1        0.77      5.44        4.122        0.21
 LONGEST FLOWPATH FROM NODE     54.00 TO NODE     66.00 =     182.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM     RUNOFF       Tc       INTENSITY     AREA
 NUMBER      (CFS)     (MIN.)    (INCH/HOUR)   (ACRE)
     1        3.08      6.48        3.812        0.86
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE     66.00 =     450.00 FEET.

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

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER     (CFS)     (MIN.)    (INCH/HOUR)
     1       3.36       5.44         4.122
     2       3.80       6.48         3.812

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       3.80   Tc(MIN.) =    6.48
 TOTAL AREA(ACRES) =        1.1

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

```
 FLOW PROCESS FROM NODE     66.00 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) =   882.50  DOWNSTREAM(FEET) =   881.00
 FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.43
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.80
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    6.53
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE    103.00 =     480.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  10.41   RAIN INTENSITY(INCH/HOUR) =  3.08
 TOTAL AREA(ACRES) =     4.71   TOTAL RUNOFF(CFS) =     13.04

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    924.00  DOWNSTREAM(FEET) =    896.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   190.00   CHANNEL SLOPE =  0.1474
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .1332 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      13.04
 FLOW VELOCITY(FEET/SEC) =   4.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.66   Tc(MIN.) =   11.07
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE    102.00 =     670.00 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) =  2.995
 *USER SPECIFIED(SUBAREA):
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8880
 SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    5.05
 TOTAL AREA(ACRES) =       6.6   TOTAL RUNOFF(CFS) =     18.09
 TC(MIN.) =   11.07

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   884.00  DOWNSTREAM(FEET) =   881.00
 FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.81
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      18.09
 PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   11.64
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE    103.00 =     940.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY     AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
    1       18.09    11.64        2.928        6.61
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE    103.00 =     940.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY     AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
    1        3.80     6.53        3.798        1.07
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE    103.00 =     480.00 FEET.

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

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc       INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1      13.94       6.53        3.798
    2      21.02      11.64        2.928

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      21.02   Tc(MIN.) =   11.64
 TOTAL AREA(ACRES) =        7.7

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   881.00  DOWNSTREAM(FEET) =   879.60
  FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.16
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.02
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   11.69
  LONGEST FLOWPATH FROM NODE     14.00 TO NODE    104.00 =     976.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     91.00 TO NODE     91.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  11.77   RAIN INTENSITY(INCH/HOUR) =  2.91
  TOTAL AREA(ACRES) =     4.96   TOTAL RUNOFF(CFS) =     12.83

****************************************************************************
  FLOW PROCESS FROM NODE     91.00 TO NODE    104.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   904.00  DOWNSTREAM(FEET) =   879.60
  FLOW LENGTH(FEET) =   330.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.60
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.83
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   12.15
  LONGEST FLOWPATH FROM NODE     14.00 TO NODE    104.00 =    1306.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
      1       12.83    12.15        2.873        4.96
  LONGEST FLOWPATH FROM NODE     14.00 TO NODE    104.00 =    1306.00 FEET.
```

```
 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc       INTENSITY     AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
     1       21.02    11.69       2.923        7.68
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE    104.00 =     976.00 FEET.

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

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER    (CFS)      (MIN.)   (INCH/HOUR)
     1       33.37      11.69        2.923
     2       33.49      12.15        2.873

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      33.37   Tc (MIN.) =   11.69
  TOTAL AREA(ACRES) =       12.6
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)  =      12.6  TC(MIN.) =     11.69
  PEAK FLOW RATE(CFS) =     33.37
===============================================================================
===============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

METHODOLOGY

The hydrology calculations for determining the on-site and offsite flows have been conducted using the Rational Method from the Riverside county Hydrology Manual using the AES software. The rational method relates rainfall intensity, the ratio of runoff to rainfall, and the drainage area size to the peak storm runoff and is expressed by the equation: Q = CIA. Where Q = runoff (in cubic feet per second), C = runoff coefficient relating the ratio of runoff to rainfall, I = rainfall intensity (in inches per hour), A = drainage area (in acres).

The Riverside County uses the SCS soils classification system, which classifies soils into four (4) types: A through D with D being the least pervious, thus providing the highest runoff potential.

The soil type used in the analysis is a majority Type B per Hydrologic Soil Group Map Figure C-16. Applicable soil types and limits are shown on the hydrologic soil group map.

The onsite existing and proposed condition hydrology maps, respectively, summarize the results of the hydrologic analysis, including drainage areas, subareas, node numbers, elevations and cumulative Q_{100} values at points of concentration or discharge.

RESULTS

PRE-DEVELOPED HYDROLOGY

Based on the Hydrology calculations prepared for the Temescal Canyon Road Widening Project the predeveloped – existing condition discharge for the Project, including the discharges from the offsite tributary subareas (west of I-15) and the from the southerly property, APN 282-121-009 is listed in the table below:

Summary Hydrology Drainage Sub-areas for Existing Condition – Rational Method 100-year storm (see below for calculation):

Drainage Area	Area in Acre	Q_{100} sub-area in cfs.	T_C min
Line B (system 5)	4.71	13.04	10.41
Line A (system 6)	4.96	12.83	11.77
APN 282-121-009 & APN 282-121-008	3.11	8.046	11.77
At confluence node 34	12.78	33.92	11.77

POST DEVELOPED HYDROLOGY

Based on the Site Plan and the 100-year Storm Hydrology calculations prepared for the Project in its developed condition and including the discharges from the offsite tributary subareas (west of I-15) and from the southerly property, APN 282-121-009 the table below lists Design Q's:

Summary Hydrology Drainage Sub-areas for Proposed Condition – Rational Method 100-year storm (see below for calculation):

Drainage Area	Area in Acre	Q_{100} sub-area in cfs	Notes
Node 16	0.4	1.5	Upper Parking Lot
Node 21	0.6	2.27	Upper Parking Lot
Node 61	0.7	2.66	Lower Parking Area
Node 59	0.2	0.77	Lower Parking Area
Node 65	0.9	3.08	Lower Parking Area
Node 66	1.1	3.80	Project Q. Area 1.1 Acres
Node 103	7.7	21.02	Confluence with Line B
Node 104	12.6	33.40	Confluence with Line A

CONCLUSIONS

The proposed project grading and proposed drainage systems are in conformance with Condition of Approval and proposed Land Use. Potential project impacts related to drainage runoff and water quality will be evaluated and mitigated according to City and County requirements.

The Project has been graded and designed to accommodate off-site discharges as calculated by the ***Drainage Report for the Temescal Canyon Road Widening Project, Leroy Road to Dos Lagos Drive, dated June 27,2017 by the Riverside County Transportation Department***. The report routed the offsite 100-year storm discharges across the project site using the existing undeveloped topography and a projected commercial type development and confluence these offsite discharges at the northeast corner of the project site to a headwall and the beginning of the Temescal Canyon Road Storm Drain, Lateral C-1, a 30" RCP.

The on-site proposed-developed 100-year storm has been calculated using the Riverside County Hydrology Manual and the City of Corona requirements and confluence with the offsite discharges at the existing headwall that connects to the Temescal Canyon Road Storm Drain, Line C-1 and the results are the same as calculated by the County report.

We have therefore concluded that the Temescal Canyon Road Storm Drain, Lateral C-1 will not be impacted by the development of the project site and no detention would be required.

The proposed backbone storm drain system is designed for ultimate / proposed condition for the 100-year storm event. This report provides the discharges to design the infiltration storage pipes,

inlets, storm drainpipes, as well as to evaluate water quality BMPs to make sure that the system is capable to pass the 100-year event and comply with the various water quality BMPs mitigation requirements by the City of Corona review and approval process.

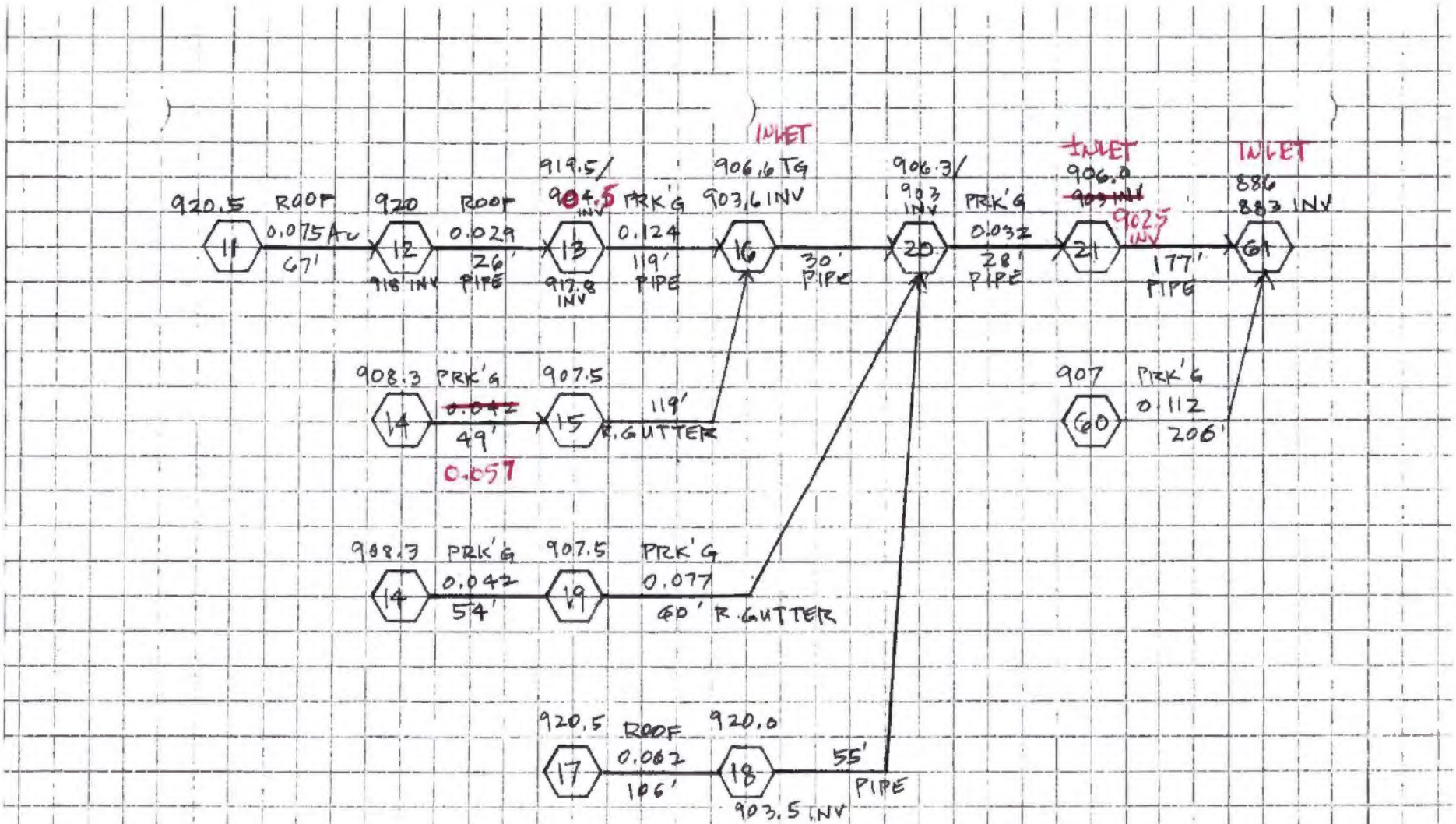
Preliminary Hydraulic Calculations (using open channel normal depth calculations) for Pipe elements and the grate inlets are provided in Appendix E of this report. Final Report will provide final hydraulic calculations

REFERENCES

1. County of Riverside County Flood Control and Water Conservation District Hydrology Manual, as incorporated in the AES Rational Method Hydrology Software.
2. Aerial Topography
3. Grading and Drainage Plans
4. Hydraulic Elements (HELE 1) Calculations software by AES.

APPENDIX A

SCHEMATIC HYDROLOGY FLOW CHART

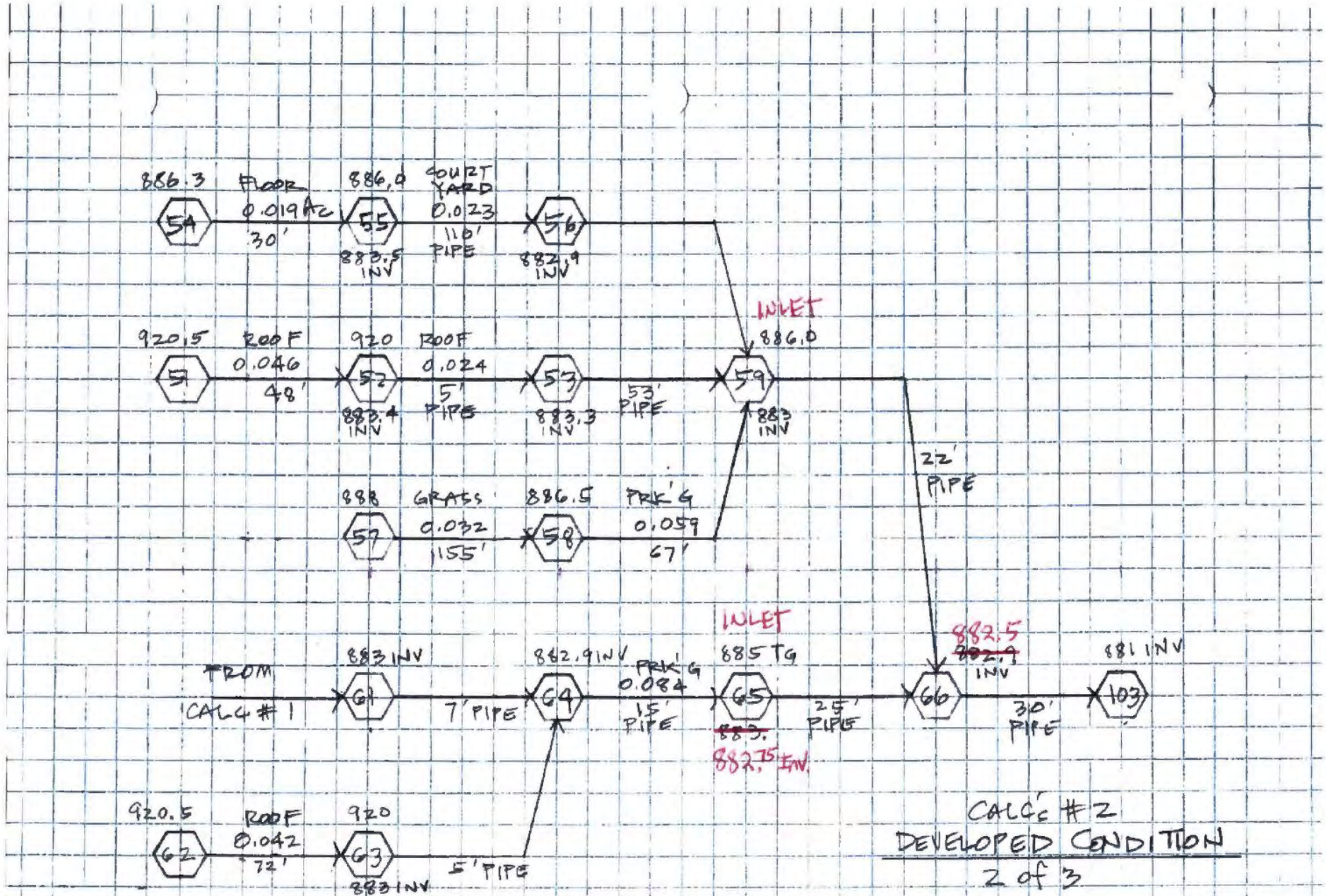


CALC'S #1

R. GUTTER = RIBBON GUTTER
PRK'G = PARKING (AREA)

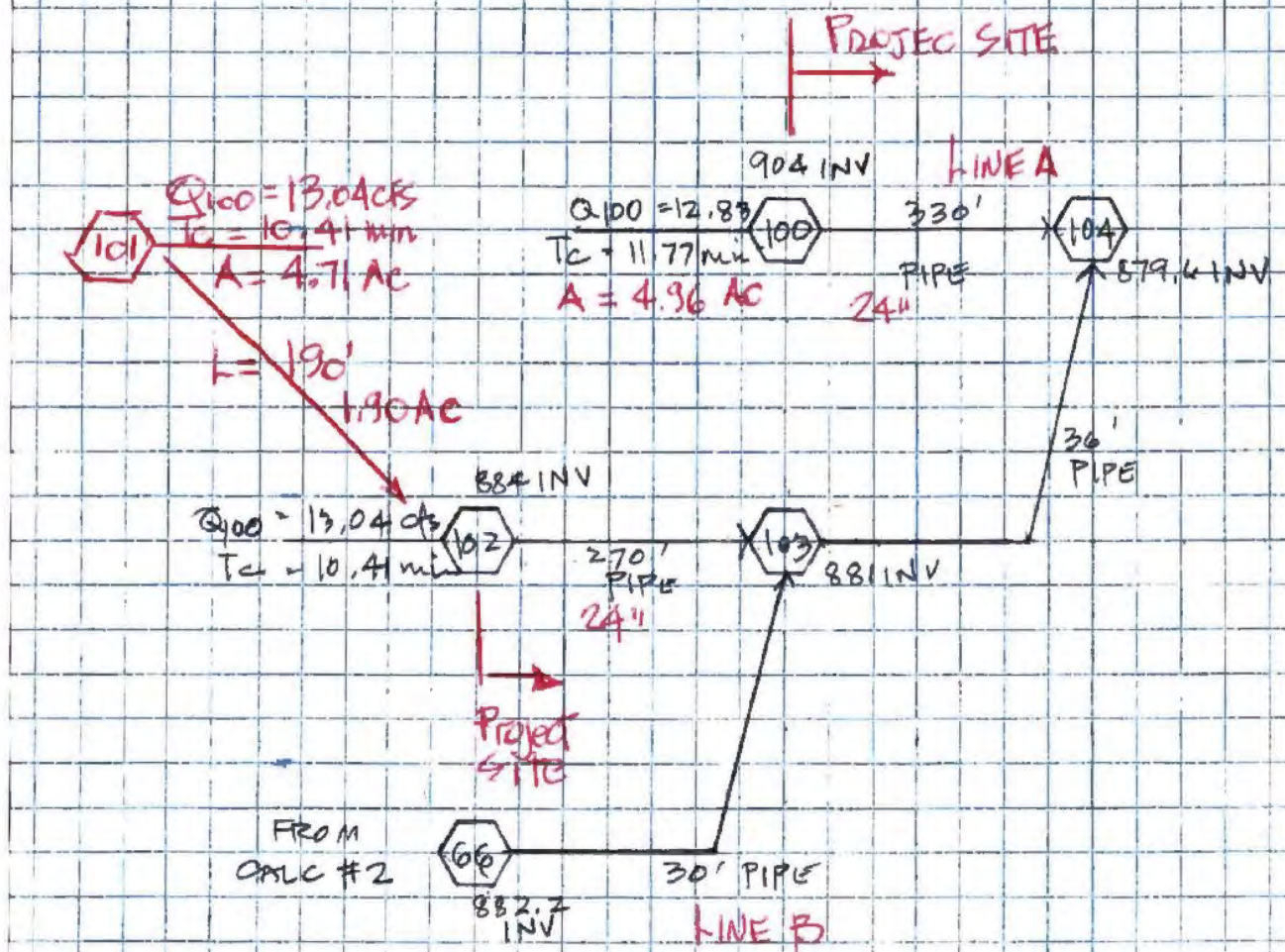
DEVELOPED CONDITION
1 OF 3

SCHEMATIC HYDROLOGY FLOW CHART



CALC'S #2
DEVELOPED CONDITION
2 of 3

SCHEMATIC HYDROLOGY FLOW CHART



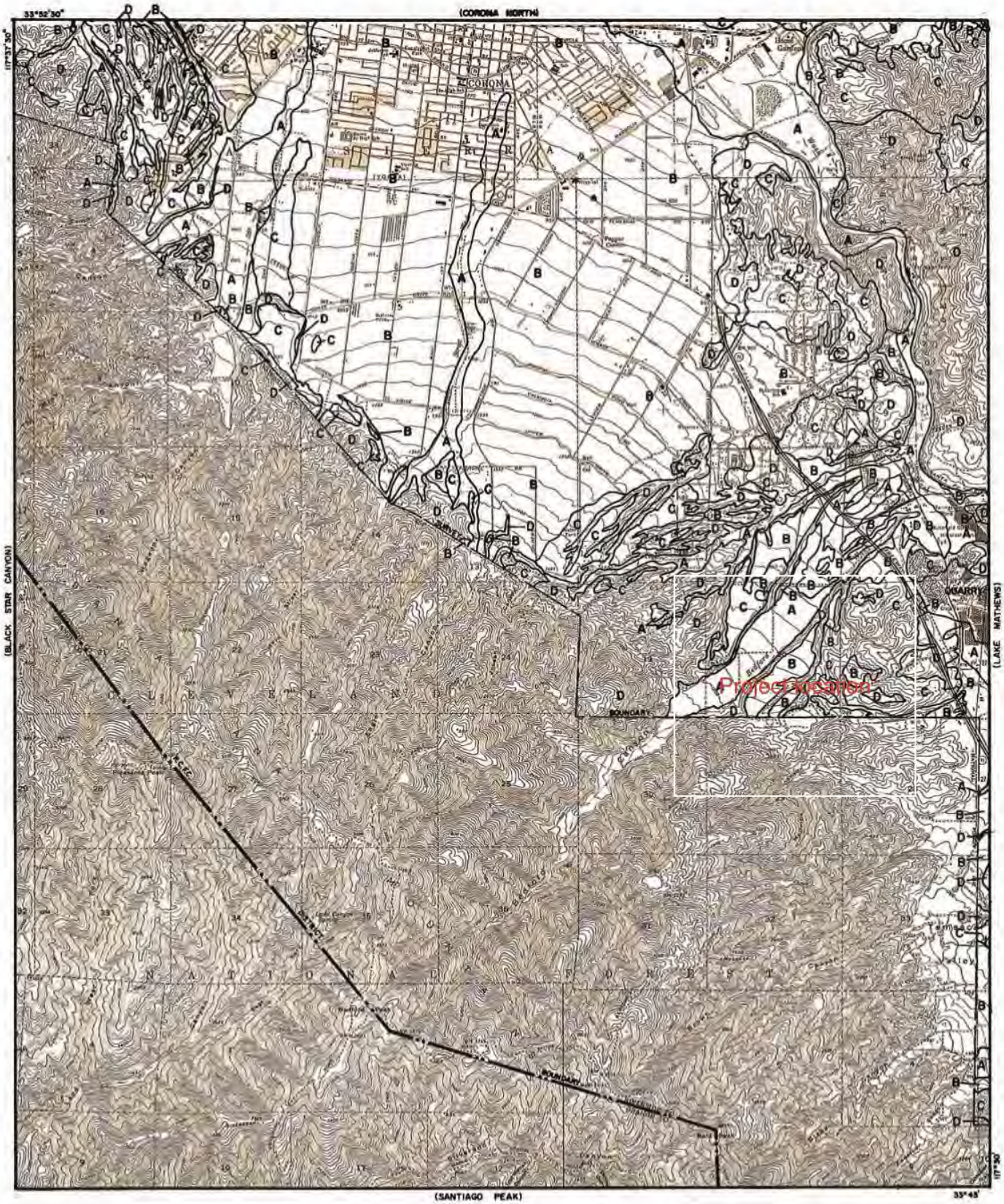
CALC # 3
DEVELOPED CONDITION
3 OF 3

SCHEMATIC HYDROLOGY FLOW CHART

APPENDIX B

HYDROLOGIC SOILS GROUP MAP

PLATE C-1.27



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR CORONA-SOUTH

PLATE C-1.27

APPENDIX C

WEB SOIL SURVEY – PROJECT SITE COORDINATES

Search

Area of Interest

Quick Navigation

Address

State and County

Soil Survey Area

Latitude and Longitude or Current Location

View

Show current location: click to get location

Latitude, Longitude

Display location marker

View

PLSS (Section, Township, Range)

Bureau of Land Management

Department of Defense

Forest Service

National Park Service

Hydrologic Unit

Area of Interest Interactive Map

View Extent: Contiguous U.S. | Scale

Identify

Layer	Attribute Name	Attribute Value
Location	Latitude, Longitude	33.80494°, -117.50516°
Area of Interest (AOI)	Area (acres in this part)	0.61
	AoiID	17199106
States	State Name	California
	State Abbreviation	CA
	State FIPS Code	06
Counties	County Name	Riverside
	FIPS Code	06065
	State Name	California

Layer	Attribute Name	Attribute Value
Aerial Photography	Date(s) Photographed	Mar 14, 2022—Mar 17, 2022

APPENDIX D

SOIL MAP

Soil Map—Western Riverside Area, California

Map Scale: 1:563 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 25 50 100 150

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 15, Sep 6, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 14, 2022—Mar 17, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GdC	Garretson gravelly very fine sandy loam, 2 to 8 percent slopes	0.5	48.8%
PID	Placentia fine sandy loam, 5 to 15 percent slopes	0.6	51.2%
Totals for Area of Interest		**1.1**	**100.0%**

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties–Western Riverside Area, California

Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
GdC—Garretson gravelly very fine sandy loam, 2 to 8 percent slopes														
Garretson	85	B	0-10	Gravelly very fine sandy loam	SC-SM, GM, SM, GC-GM	A-4	0- 0- 0	5-10- 15	65-75-85	60-70-80	50-60-70	35-43-50	25-30-35	5-8 -10
			10-53	Gravelly loam, gravelly sandy clay loam	SC-SM, GC, SC, GC-GM	A-4, A-6	0- 0- 0	5-10- 15	65-75-85	60-70-80	50-60-70	35-43-50	25-30-35	5-10-15
			53-72	Loam	CL, CL-ML	A-4, A-6	0- 0- 0	0- 0- 0	95-98-100	90-95-100	75-80-85	50-55-60	25-30-35	5-10-15

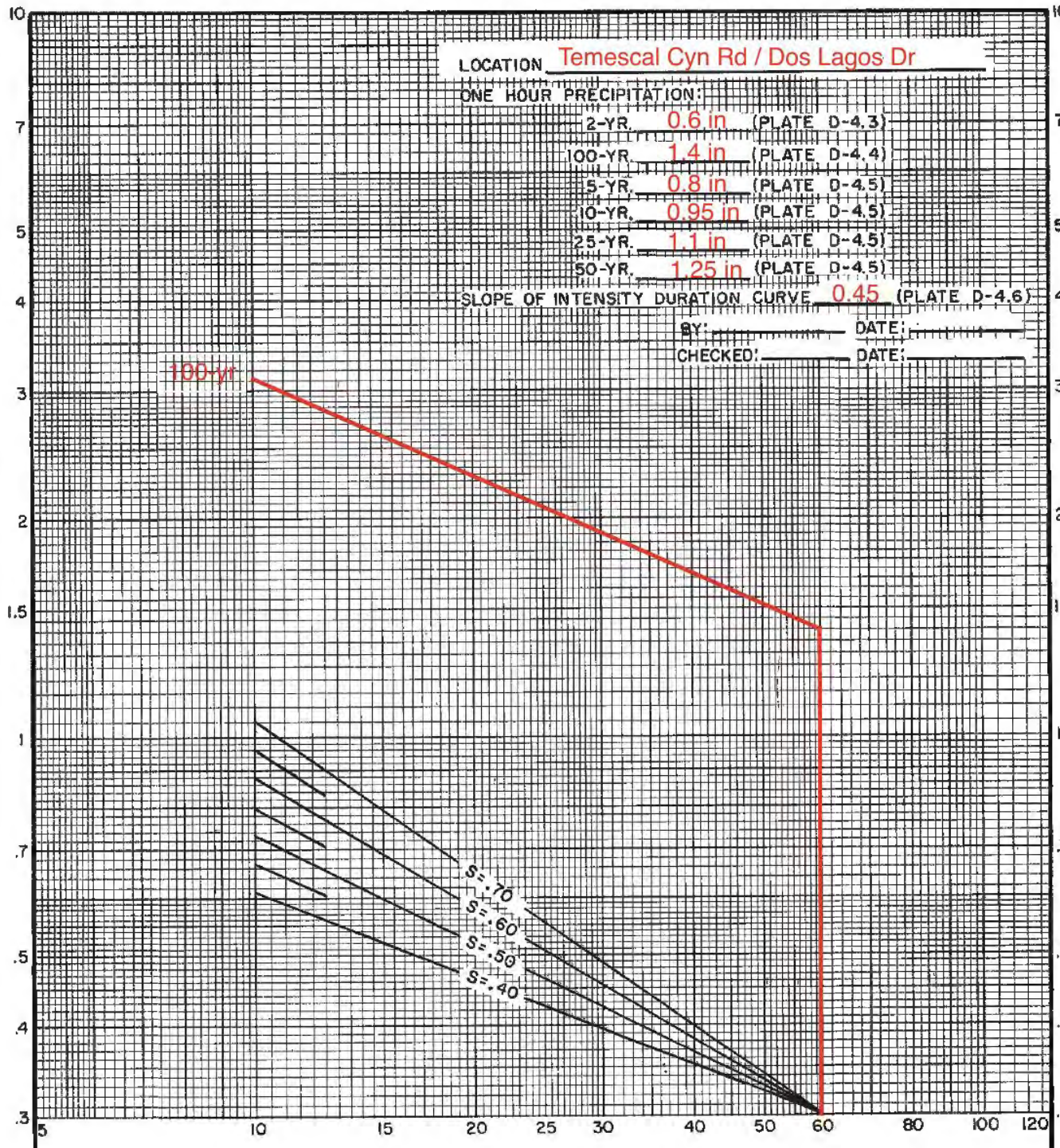
Engineering Properties–Western Riverside Area, California														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
PID—Placentia fine sandy loam, 5 to 15 percent slopes														
Placentia	85	D	0-18	Fine sandy loam	SM	A-4	0- 0- 0	0- 0- 0	90-95-100	85-93-100	60-73-85	35-43-50	20-25-30	NP-3 -5
			18-39	Clay, sandy clay	CL, CH	A-7	0- 0- 0	0- 0- 0	90-95-100	75-88-100	70-80-90	50-60-70	40-50-60	20-28-35
			39-57	Clay loam, sandy clay loam	CL, SC	A-6	0- 0- 0	0- 0- 0	90-95-100	75-88-100	70-78-85	35-48-60	20-30-40	10-15-20
			57-60	Gravelly sandy loam	GM, SM	A-2	0- 0- 0	0- 0- 0	60-73-85	50-63-75	45-53-60	25-30-35	20-25-30	NP-3 -5

Data Source Information

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 15, Sep 6, 2022

APPENDIX E

INTENSITY -DURATION CURVES – PLATE D-4.7



RCFC & WCD

HYDROLOGY MANUAL

INTENSITY – DURATION CURVES CALCULATION SHEET

PLATE D-4.7

APPENDIX F

TEMESCAL CANYON ROAD WIDENING PROJECT – DRAINAGE REPORT, JUNE 27,2017

The drainage inlet on Soldat property (referenced as APN 282-121-008) is located at Node 34 on the hydrology map (PDF page 65) with Q100 of 33.92 cfs entering Lateral C-1 (PDF page 70).

TEMESCAL CANYON ROAD WIDENING PROJECT

LEROY ROAD TO DOS LAGOS DRIVE

WORK ORDER C6-0066

DRAINAGE REPORT

June 27, 2017

INFORMATION ONLY

NOT FOR PUBLIC RELEASE

Prepared for:

Riverside County Transportation Department

Submitted by:

NCM Engineering
4740 Green River Road, Suite 218
Corona, CA 92880

TABLE OF CONTENTS

APPENDICES

1. INTRODUCTION

The Temescal Canyon Road Widening Project (C6-0066) is located in an unincorporated area in the County of Riverside. The project work limit begins from Leroy Road to Dos Lagos Drive. This project will add additional travel lanes and modify curves to enhance traffic flow and safety.

Figure 1 - Vicinity Map

The purpose of this drainage report is to verify the existing drainage conditions and provide hydraulic calculations for the proposed drainage pipe systems and inlets. The calculations developed in this report conform to Riverside County Flood Control and Water Conservation District (RCFC&WCD) design criteria and standards. Offsite drainage improvement or mitigation are not part of the project and shall be addressed separately.

Hydrologic modeling was based on a single 100-yr storm event.

Hydraulic computations were performed to determine drainage inlet sizes and storm drain conveyance capacity to assure proper street flow interception and flood width so that one travel lane would remain open in each direction during the design storm event.

2. TOPOGRAPHY AND LAND USE

The project site is located east of the I-15 freeway and is situated at the foothill of Bedford Peak. The project's upstream watersheds generally have gradients of 8% to 16% and the surface runoff flows northeasterly toward I-15 freeway. The runoff discharges to Temescal Creek.

For drainage area delineation purposes, the following topographic maps were used for drainage analysis:

- The project 1-ft topography which focuses on the detailed site features along the road widening project corridor.
- RCFC&WCD's 4-ft topography which gives a refined relief detail beyond the project topography limit.
- The 2015 USGS 7.5-minute topography maps with 40-ft contours which covers very large area and shows mountainous flow pattern.

The zonings (see Appendix E) along Temescal Canyon Road are primarily Commercial Retail and Commercial Office. For the upstream tributary areas located west of I-15, the land use comprises of Commercial Office, Light Industrial, Conservation Habitat and Rural Community (Estate Density) Residential.

3. METHODOLOGY

Precipitation

The 2-yr and 100-yr precipitation data for the project drainage area were obtained from the Isohyetal Maps in the RCFC&WCD Hydrology Manual (Plate D-4.3 & 4.4). The project location reads 0.6 inch and 1.4 inch for 2-yr 1-hr and 100-yr 1-hr precipitation. The precipitation maps are included in Appendix A.

An intensity-duration curve slope of 0.45 was used for the calculations in accordance with RCFC&WCD Plate D-4.6. Intensity-duration curves were determined based on the slope and the 100-yr 1-hr precipitation to define the relationship of rainfall intensities against duration less than 60 minutes.

Soil Groups

According to the Hydrologic Soils Group Map (Plate C-1.27 Corona South), the project upstream watershed consists of soil types D or C, which are soils with lower infiltration rate and higher runoff potential. Copies of the Hydrologic Soils Group Maps for the project site are included in Appendix A.

Runoff Calculation

The rational method from Section D of RCFC&WCD Hydrology Manual (1978) was used to determine the runoff generated by the subareas. The CivilDesign Hydrology Package, Riverside County module was used to facilitate the hydrologic calculations and the Temescal Canyon Land Use Map (2015) was used to determine watershed land use (See Appendix E).

The hydrologic calculations for drainage areas were established using the rational method and AMC value of 3 in the 100-year storm event analysis, in accordance with Section C in RCFC&WCD Hydrology Manual

Time of concentration (t_c) for initial subareas areas is based on the RCFC&WCD's nomograph (Plate D-3). Hydrology calculations are included in Appendix B.

Hydrology maps for offsite and onsite conditions indicating drainage subareas, boundaries, area designation, acreage, and runoffs are included in Appendix E.

Pipe Hydraulics

CivilDesign's WSPGW (v14.08) was utilized to determine the water surface profile in a proposed storm drain system. Manning's coefficient of 0.013 was used for concrete pipe modeling. If the downstream water surface elevation is not known, the pipe soffit elevation will be assumed for hydraulic grade line modeling purposes. The pipe hydraulic analysis results can be found in Appendix D.

Inlet Capacity

Bentley Flowmaster was utilized for inlet capacity sizing. The inlet calculation modules in the program can simulate side-opening inlet, grate inlet, or combination of these inlets in both by-pass and sag conditions based on the FHWA Urban Drainage Manual HEC-22 methodology. The calculations have assumed that all inlets will be subject to 50% clogged and the results can be found in Appendix C.

4. EXISTING AND PROPOSED DRAINAGE FACILITES

Historically, the runoff from Bedford Peak drains northeasterly towards both I-15 and Temescal Canyon Road before discharging to Temescal Creek. After years of development, there are now eight major drainage facilities across the I-15 freeway located west of the project site that handle the terrain surface flow.

These facilities are illustrated in Figure 4.1 below to show the existing drainage conditions in the area. The project storm drain improvement plans are included in Appendix E for reference.

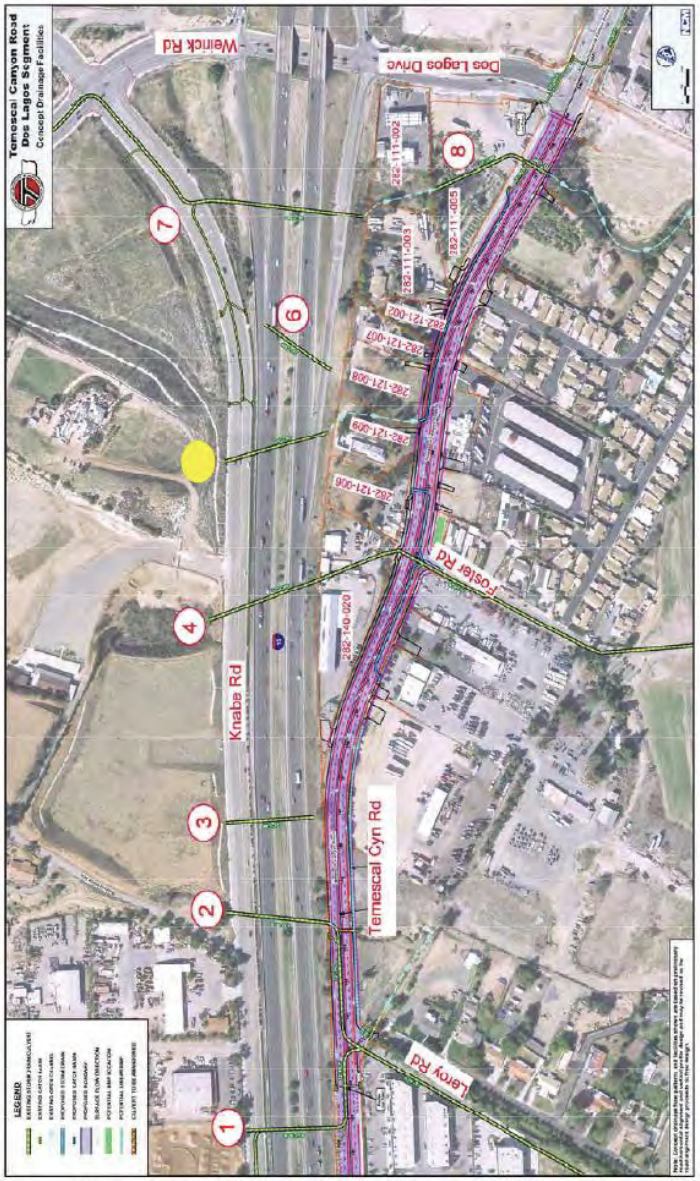


Figure 4.1 – Existing Offsite Drainage Facilities Map

System 1 – an existing 8'x5' RCB. This facility handles a large amount of the flow from the hillside tributary across I-15. It also intercepts surface runoff from Knabe Road, I-15 and Temescal Canyon Road. This facility transitions to an existing 72" RCP on Temescal Canyon Road and merges with System 2.

System 2 – an existing 8'x5' RCB. This facility also conveys the stormwater from the same watershed of System 1 as a parallel discharge system. System 1 and 2 merge at Leroy Road and become one at the 78" RCP along Leroy Road. This system discharges directly to Temescal Creek approximately 1800 feet east.

System 3 – an existing 24" CMP culvert. This facility conveys surface flow from a small tributary area west of I-15 and discharges at the west side of Temescal Canyon Road. The discharge flows northerly behind the existing curb to a pond located approximately 150 feet away from the culvert exit. If there is excessive flow from the culvert, the discharge may overflow onto Temescal Canyon Road and continue to drain northerly on the west side of the road.

The project will add an inlet to intercept this offsite flow and minimize run-on to the roadway.

System 4 – an existing 54" CMP. This facility carries a large amount of flow from a portion of the large drainage area within "The Retreat" community, which is located approximately 3000 feet to the west. This facility also intercepts a good portion of the runoff from APN 282-140-020 and some Temescal Canyon Road street flows. The conveyance system becomes a 60" RCP along Foster Road and discharges to Temescal Creek located approximately 1500 feet east.

The project will add catch basins along the street to enhance the roadway drainage capability. Two proposed drainage systems (Line B1 and B2) will connect to this system for discharge purposes.

System 5 – an existing 24" CMP. This system conveys surface flow from a small tributary area west of I-15 and discharges within Caltrans right-of-way. Downstream of the culvert exit, the discharge follows the natural drainage course within APN 282-121-009 and APN 282-121-008 before merging with the gutter flow on Temescal Canyon Road.

During a 100-year storm event, APN 282-121-009 and APN 282-121-008 may be subject to standing water due to the spreading ground effect and poor soil infiltration (Soil Group D). In-lot drainage improvement is not part of the project scope so no study was performed to further evaluate the drainage impact in these properties. The corresponding drainage improvement shall be property owner's responsibility.

However, the project has proposed a drainage inlet in front of these two properties to help intercept the surface flows. These properties may opt to tie to the new county

storm drain system for better drainage capability.

System 6 – an existing 24" CMP. This system intercepts I-15 surface flow and discharge within Caltrans right-of-way. Similar to System 5, the downstream of System 6 also follows the natural drainage course for a short distance and the surface flow will traverse across both APN 282-121-009 and APN 282-121-008. These two properties may also be subject to standing water during a 100-year storm event due to the spreading ground effect and poor soil infiltration (Soil Group D).

In-lot drainage improvement is not part of the project scope so no study was performed to further evaluate the drainage impact in these properties. The corresponding drainage improvement shall be property owner's responsibility.

The project has proposed a drainage inlet in front of these two properties to help intercept the discharge from both System 5 and System 6. These properties may opt to tie to the new county storm drain system for better drainage capability.

System 7 – an existing 54" CMP. This system conveys the offsite flows from the storm drain system on Weirick Rd and a portion of Knabe Road and outflows within Caltrans right-of-way. The downstream of System 7 follows the natural drainage course through APN 282-111-003 and APN 282-111-002, then discharges to System 8.

According to "The Retreat" drainage report (S.P. 317, Tract 17888), there would be approximately 292.8 cfs within System 7 during a 100-yr storm event, which may cause local flood concerns to both the properties around and the street intersection at Dos Lagos Dr and Temescal Canyon Road. It is recommended to improve the drainage condition at the downstream of System 7 by connecting both System 7 and System 8 to avoid the spreading effect in the area.

However, the properties mentioned above are private and the area in question is out of the project scope. Therefore, the said improvement can only be conditioned to the property owners when the properties are redeveloped.

System 8 – an existing 42" CMP. This system receives flows from System 7 and the neighboring properties, then discharges across Temescal Canyon Road on the east side. The discharge follows a natural stream course and merges with Temescal Creek located 850 feet east of Temescal Canyon Road.

5. RESULTS

The proposed road widening will not result in significant drainage impacts to the general drainage patterns in the area. New drainage systems will be installed on Temescal Canyon Road to handle the onsite area flows and offsite run-on. Catch basins will be located at the appropriate interval to minimize the street flood potential. Hydrology modeling results are listed below for sizing the proposed drainage improvements.

Node	Feature	Q_{100} (cfs)
20.0	Pipe (Line C)	349.5
34.0	Headwall (Line C1)	33.92
36.0	Pipe (Line C1)	42.3
36.3	Curb Inlet CB (Line C2)	8.4
57.5	Grate Inlet CB (Line B1)	21.26
58.3	Curb Inlet CB (Line B3)	5.84
58.3	Pipe (Line B1)	26.36
58.7	Curb Inlet CB (Line B2)	8.83
98.3	Curb Inlet CB (Line A)	4.69

According to the pipe hydraulic analysis results in Appendix D, Line C (existing 42" CMP, see System 8 in Fig 4.1) was found to be incapable of handling a 100-yr storm event. APN 282-111-002 and 282-111-005 could also be subject to flood hazard due to the insufficient capacity and backwater effect. Therefore, a 60" RCP was proposed to replace the existing 42" CMP and improve the culvert conveyance.

The proposed upgrade will be conducted within the current right-of-way and allow future upstream facility upgrade when the parcels are redeveloped.

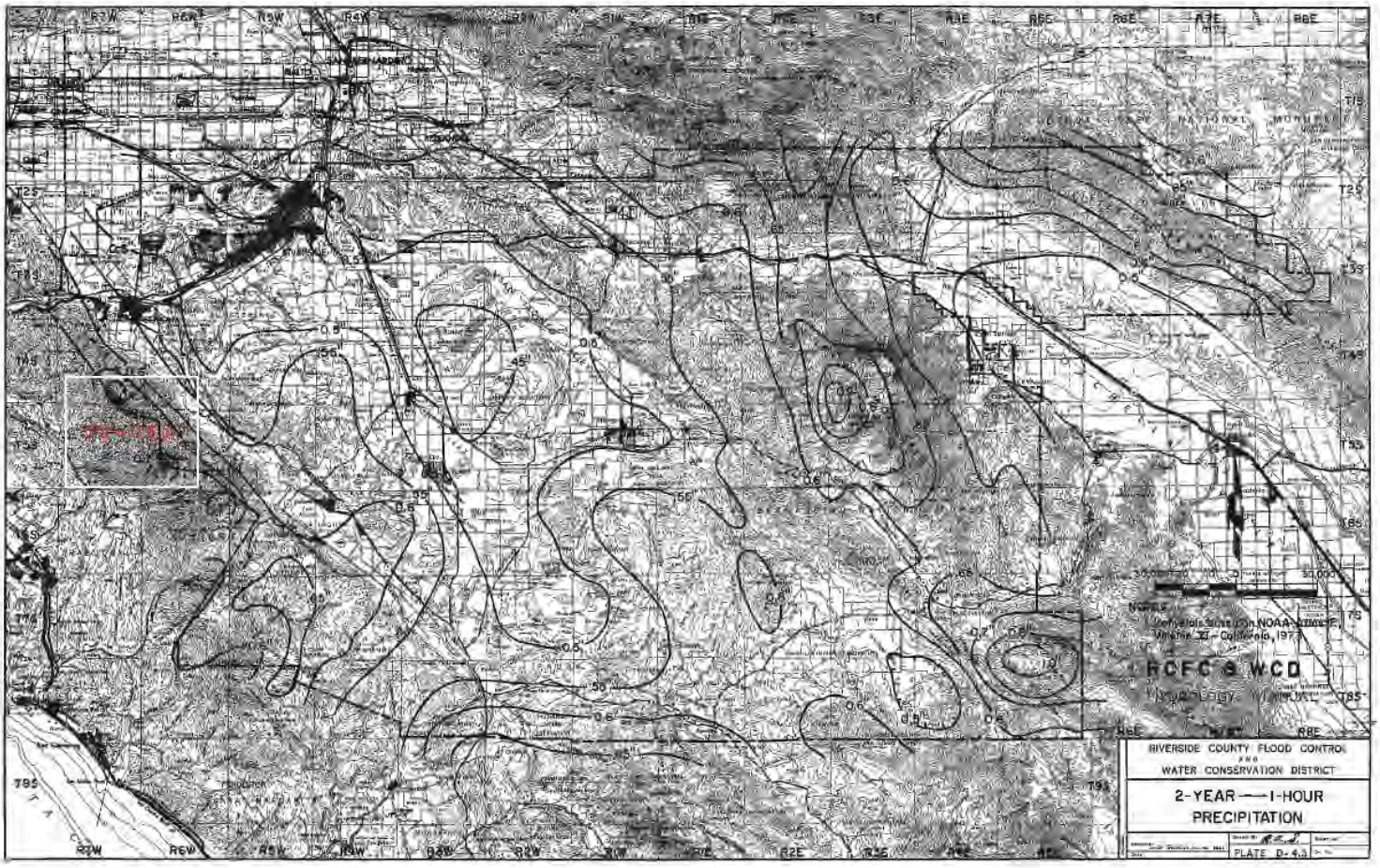
Line A, B1, B2, C, C1 and C2 will be able to handle a 100-year storm event and the catch basin inlet calculation has been summarized below:

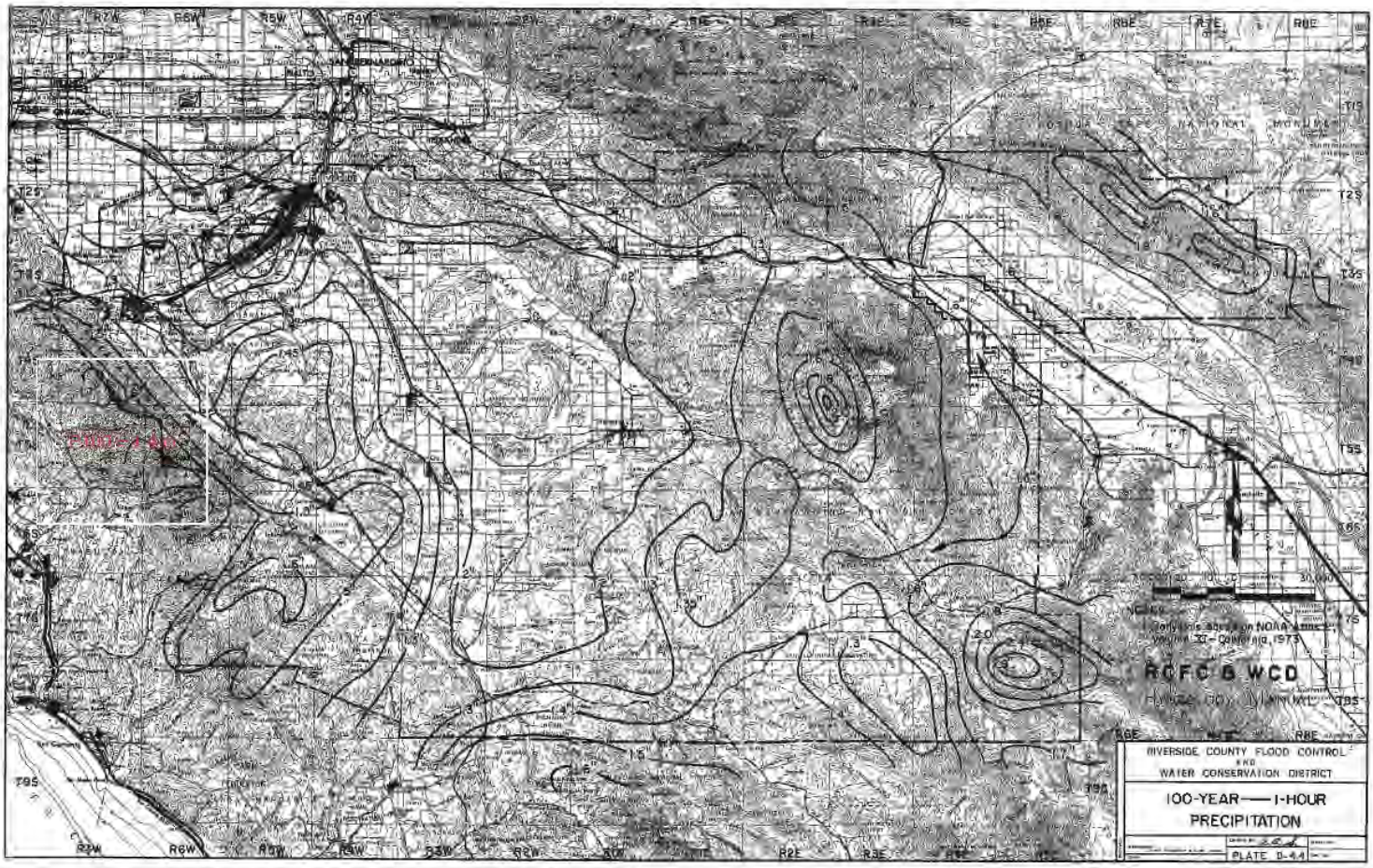
Line	Street STA	Q100 (cfs)	By-pass from u/s (cfs)	Prop. Width (ft)	Captured Flow (cfs)	By-pass flow to d/s (cfs)	By-pass to	Design Q (cfs)
A	143+33 38' LT	4.69	0	21	4.69	0	-	4.69
B2	156+75 38' LT	8.83	0	21	8.58	0.25	Dos Lagos / Temescal Int	8.83
B3	151+96 38' RT	5.84	0	21	5.84	0	-	5.84
C2	166+09 38' LT	8.4	0	21	8.08	0.32	Ex CB at 167+20 38' LT	8.4

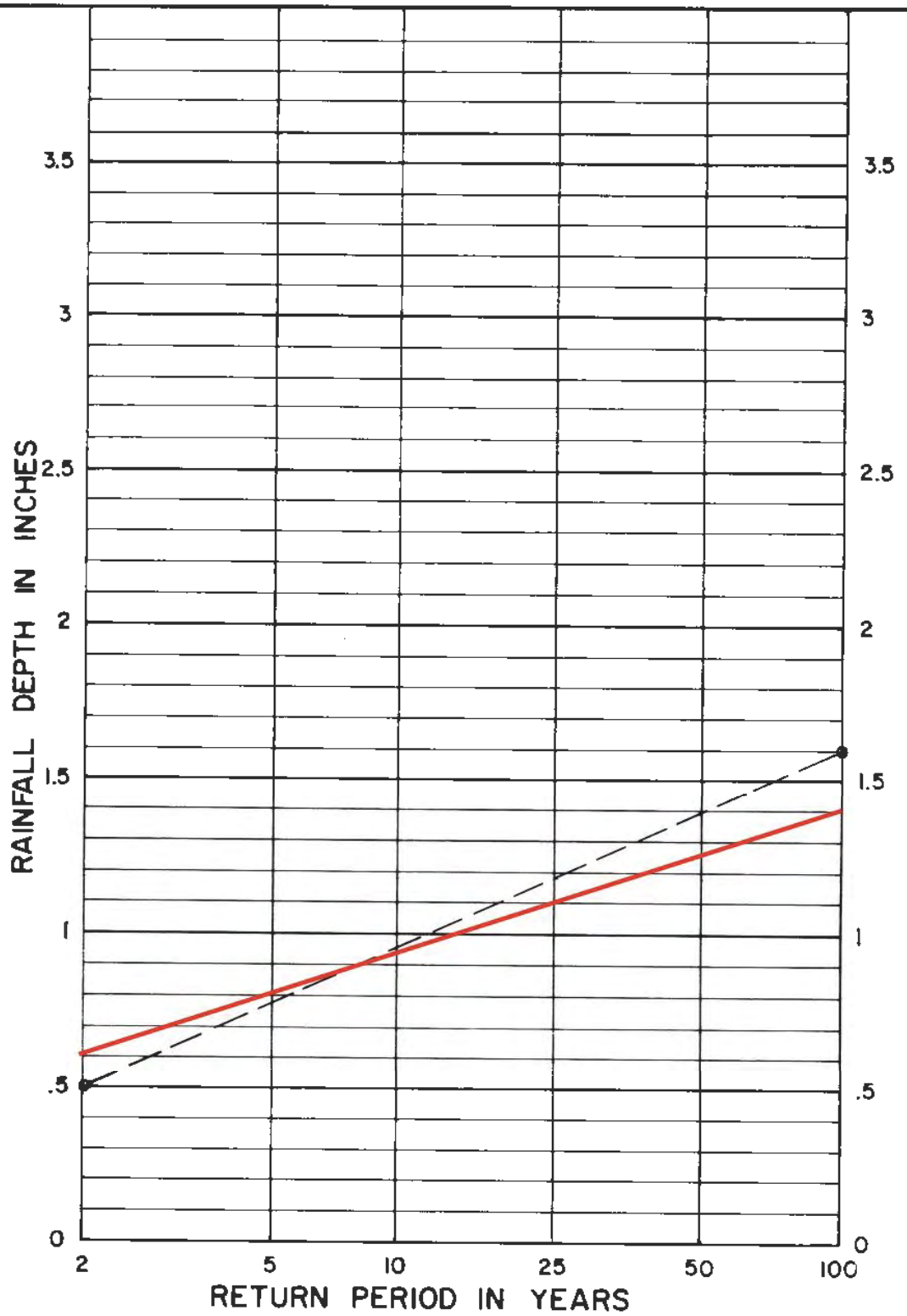
There are two proposed culvert headwalls and the following table summarizes the hydraulic conditions in a 100-year storm event:

Line	Street STA	Node	Q100 (cfs)	Allowable Head Water Elev (ft)	Calculated Head Water Elev (ft)
B1	148+85 58' LT	57.5	21.26	907.5	905.04
C1	160+27 49' LT	34.0	33.92	885.8	882.99

APPENDIX A
HYDROLOGIC MODELING DATA


RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR
PRECIPITATION
PLATE D-4.3
RCFC & WCD


RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR
PRECIPITATION
PLATE D-4.4
RCFC & WCD



NOTE:

1. For intermediate return periods plot 2-year and 100-year one hour values from maps, then connect points and read value for desired return period. For example given 2-year one hour = .50" and 100-year one hour = 1.60", 25-year one hour = 1.18"

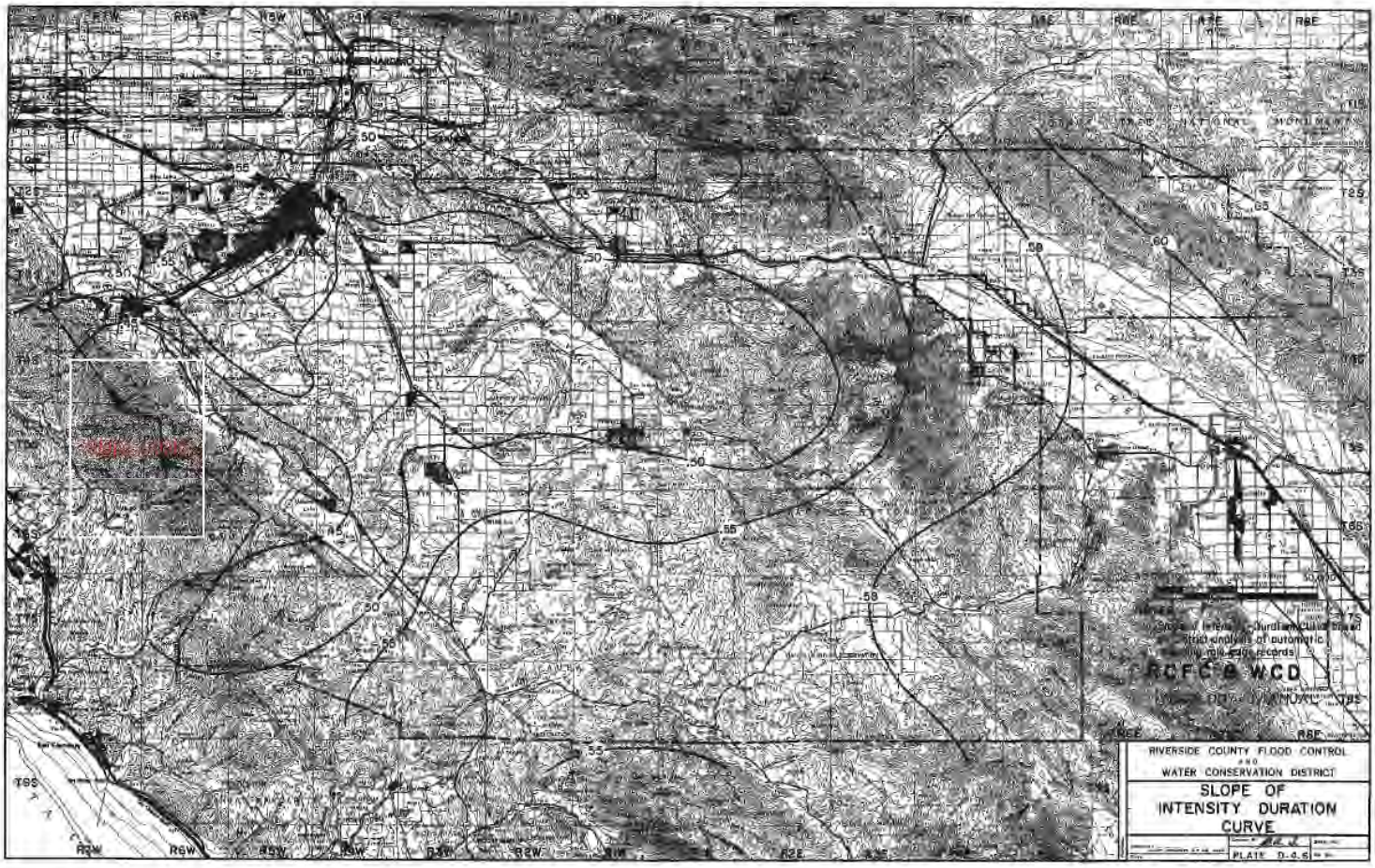
Reference: NOAA Atlas 2, Volume XI - California, 1973.

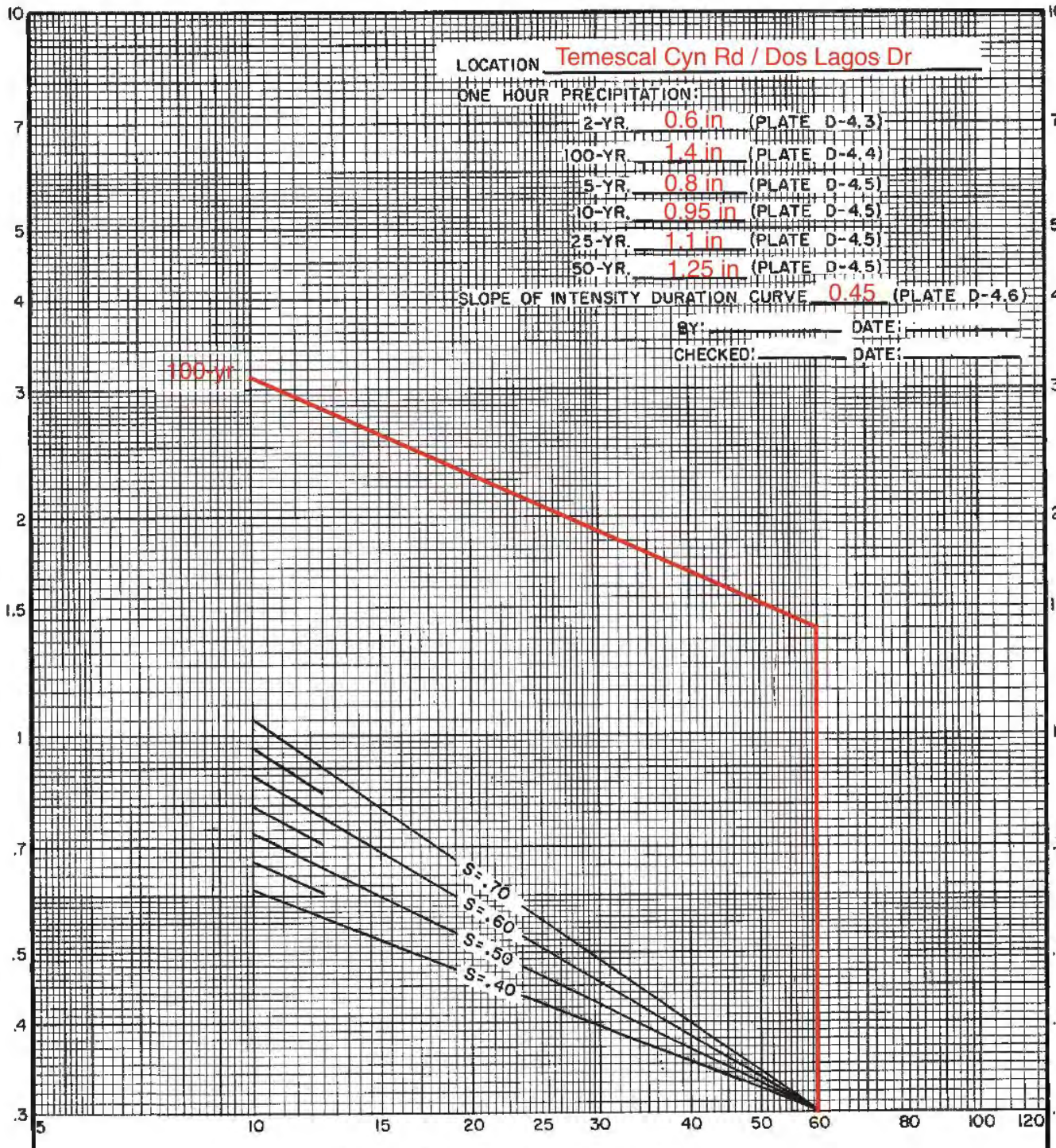
RCFC & WCD

HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS RETURN PERIOD FOR PARTIAL DURATION SERIES

PLATE D-4.5


RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
SLOPE OF
INTENSITY DURATION
CURVE
PLATE D-6.6
R.C.F.C. & W.C.D.

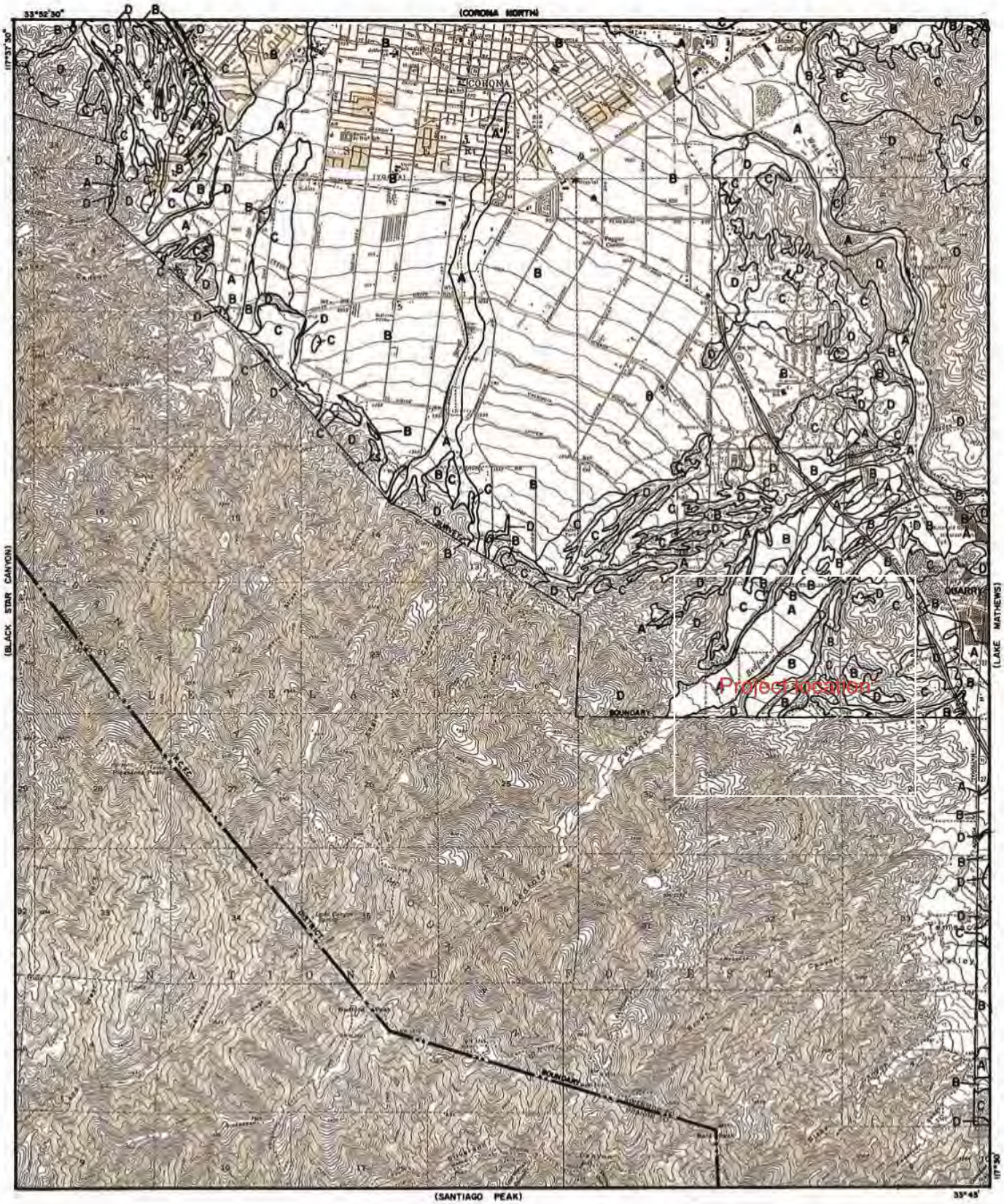


RCFC & WCD

HYDROLOGY MANUAL

INTENSITY – DURATION CURVES CALCULATION SHEET

PLATE D-4.7



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

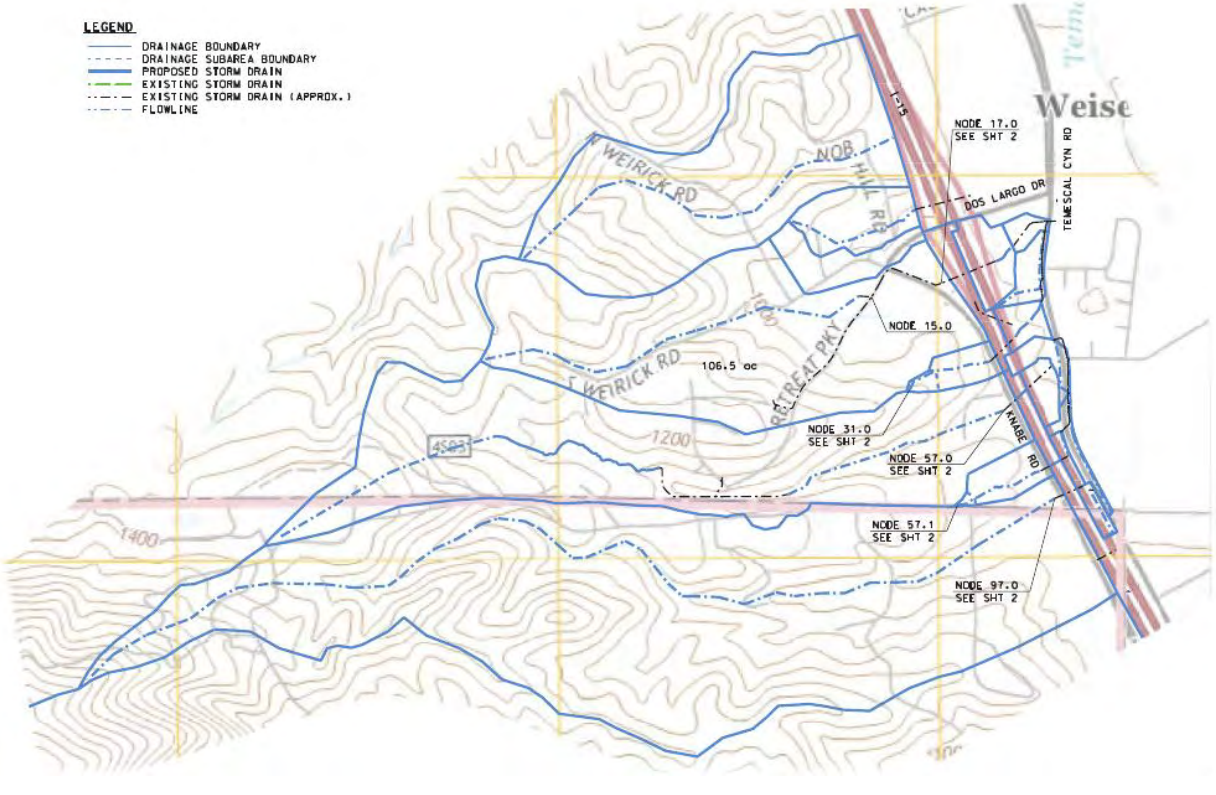
RCFC&WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR CORONA-SOUTH

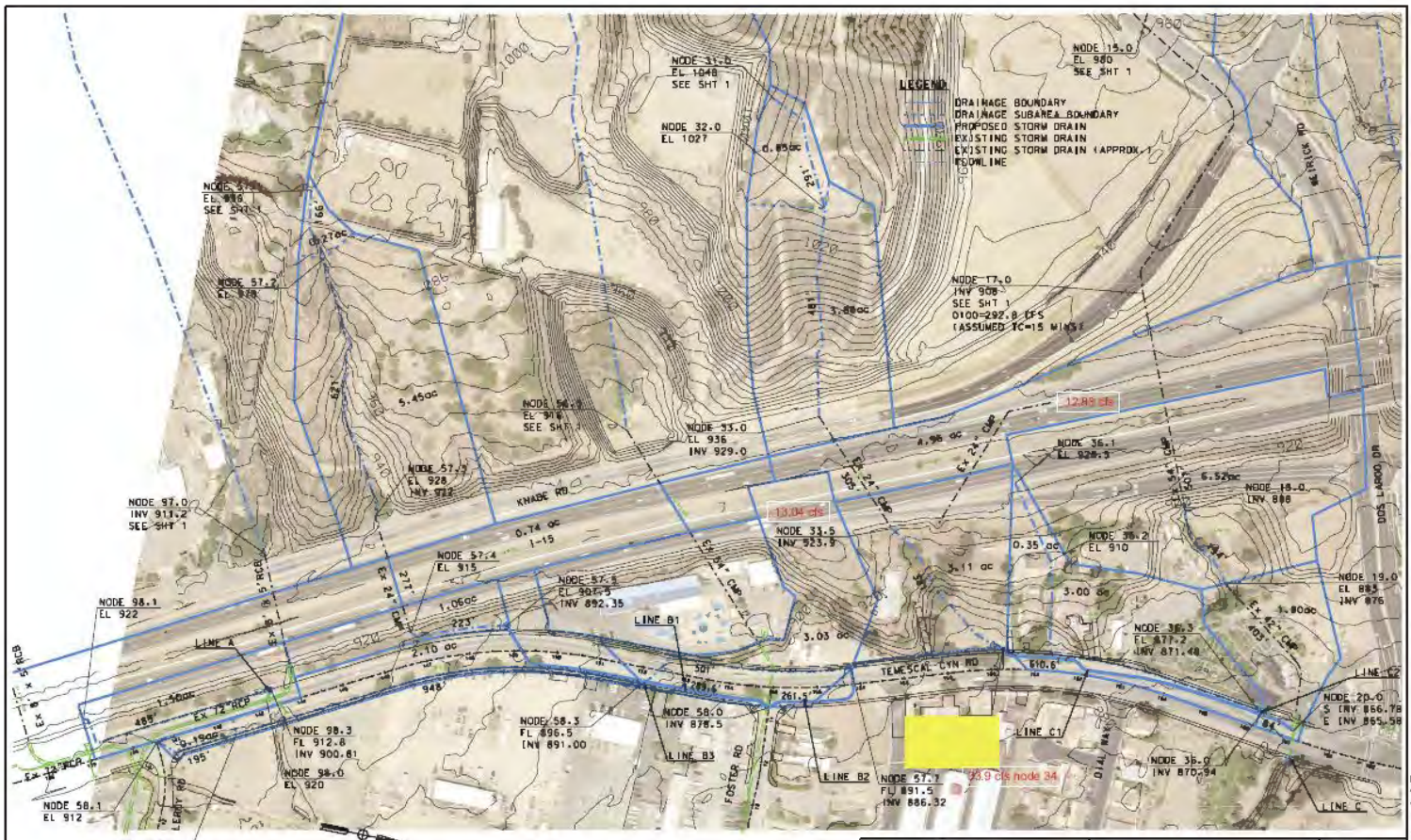
PLATE C-1.27



PREPARED BY		SHEET No.
PREPARED UNDER THE SUPERVISION OF: EDWARD MG PROJECT MANAGER MCE ENGINEERING INC. 41740 GREEN RIVER RD. STE 210 CORONA, CA 92880 DATE	TEMESCAL CANYON RD WIDENING DOS LAGOS DR TO LEROY RD OFFSITE CONDITION	SHEET 1 OF 2
USERNAME = DON FILE USER REQUEST	WO 08-0086	COUNTY FILE No.

BORDER LAST REVISED 7/27/2015

DATE PLOTTED = 03/18/2016
TIME PLOTTED = 08:00:00



PREPARED BY		SHEET No.
PREPARED UNDER THE SUPERVISION OF: EDWARD NG, No. 46767, 6/30/13, REGISTERED CIVIL ENGINEER, STATE OF CALIFORNIA	TEMESCAL CANYON RD WIDENING DOS LAGOS DR TO LEROY RD ONSITE CONDITION	sheet 2 of 2
EDWARD NG DATE PROJECT MANAGER RCE ENGINEERING INC 4740 GREEN RIVER RD, STE 210 CORONA, CA 92880		
USERNAME = DON FILE USER SPECIFIED	WO CB-0086	COUNTY FILE No.

BORDER LAST REVISED 07/21/2015

BAR PLOTTED IF TIME PLOTTED = 00:00:00 DATE / TIME

COUNTY OF RIVERSIDE

TRANSPORTATION DEPARTMENT

TEMESCAL CANYON ROAD WIDENING PROJECT LEROY RD TO DOS LAGOS DR (C6-0066)

REALIGNMENT WIDENING PROJECT

IN THE TEMESCAL VALLEY AREA

WO NO. C6-0066

FEDERAL AID No. XXXX (XXX) (IF APPLICABLE)

BASIS OF BEARING

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA COORDINATE SYSTEM, ZONE 6, NAD 83 (2017.50 EPOCH), BASED UPON GPS OBSERVATIONS OF STATIONS [illegible]

[illegible] FEET "SOUTH" [illegible] FEET "EAST"

[illegible] FEET "NORTH" [illegible] FEET "WEST"

[illegible] FEET "SOUTH" [illegible] FEET "WEST"

ALL BEARINGS, DISTANCES, AND COORDINATES SHOWN HEREON ARE GRID VALUES. TO OBTAIN GROUND VALUES, THE FOLLOWING COMBINED FACTOR SHALL BE APPLIED: [illegible]. THE LINEAR UNITS FOR THE PROJECT ARE U.S. SURVEY FEET.

BENCH MARK

THE BENCHMARK USED FOR THIS SURVEY IS "[illegible]"

EXISTING MONUMENT

ELEVATION = [illegible]

FOUND [illegible] DISC AT THE [illegible] OF [illegible]

[illegible] FEET [illegible] FEET [illegible] FEET [illegible]

ABBREVIATIONS

(REFER TO CALTRANS STD. ABBREVIATIONS FOR ADDITIONAL ABBREVIATIONS)

BF	BACK FACE
BL	BIKE LANE
BO	BATTER BOARD
BT	BACK TO BACK
C	CENTER LINE
CLF	CHAINLINK FENCE
EVMWD	ELEMENTAL VALLEY MUNICIPAL WATER DISTRICT
FD	FIRE DEPT
GFP	GALVANIZED CORRUGATED PIPE
IMP	IMPROVEMENT
NLF	NORTHERLY
RCFCWCD	RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
SAWPA	SANTA ANA WATERSHED PROJECT AUTHORITY
SE	SOUTHEASTERLY SLOPE RATIO (EQ)
SSD	SOUTHERLY SLOPE RATIO (SD)
SLF	SOUTHERLY
TP	TOP OF PIPE
TW	TRAVELWAY (EP TO EP)
TWLTL	TWO-WAY LEFT TURN LANE
WLY	WESTERLY

VICINITY MAP

TOWNSHIP 5 SOUTH, RANGE 6 WEST, SECTIONS 21
THOMAS GUIDE PG. 1000, D-1, F-1

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE
2	KEY MAP & NOTE
3 - 5	TYPICAL [illegible] SECTION
6	SURVEY CONTROL
7 - 12	LAYOUT
13 - 14	[illegible] DETAILS
15 - 18	DRAINAGE PLAN AND PROFILE
19 - 23	UTILITY
23 - 25	POTHOLING & ALL
26 - 28	[illegible]
29 - 31	[illegible]

TEMESCAL CANYON RD WIDENING PROJECT (C6-0066)

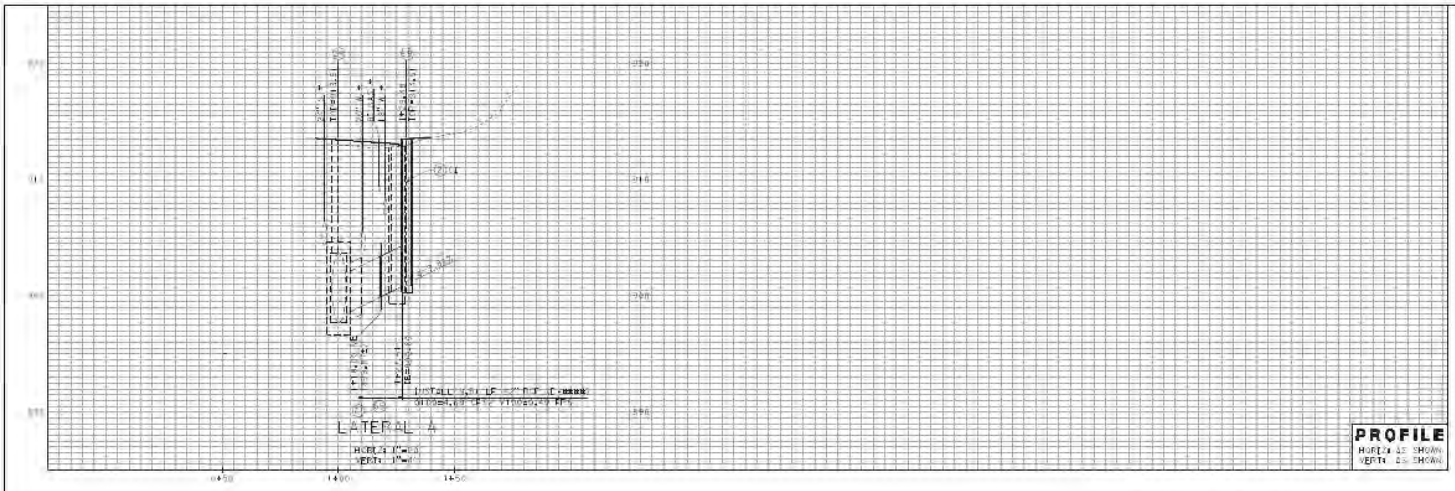
COUNTY APPROVAL	PREPARED BY	TITLE SHEET	SHEET No.
[illegible] DATE DIRECTOR OF TRANSPORTATION COUNTY OF RIVERSIDE	PREPARED UNDER THE SUPERVISION OF: [illegible] DATE PROJECT MANAGER [illegible]	TEMESCAL CANYON RD LEROY RD TO DOS LAGOS RD (C6-0066) REALIGNMENT WIDENING PROJECT	T-1 SHEET 01 OF XX

REVIEW OF PROJECT PLANS AND SPECIFICATIONS BY THE COUNTY OF RIVERSIDE IS LIMITED TO A REVIEW ONLY AND DOES NOT RELIEVE THE ENTITY OR INDIVIDUAL MAKING OR REPORTING ACTION BASED OF THE ACCURACY AND PROFESSIONAL CARE OF THEIR RESPONSIBILITY TO COMPLY WITH APPLICABLE STANDARDS FOR THE PROJECT DESIGN.

THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT, TRAFFIC SIGNAL AND ALL CONCERNED UTILITY COMPANIES AT LEAST TWO WORKING DAYS IN ADVANCE OF EXCAVATION.

[illegible] FEET [illegible] METERS

[illegible]	WO C6-0066	COUNTY FILE No.

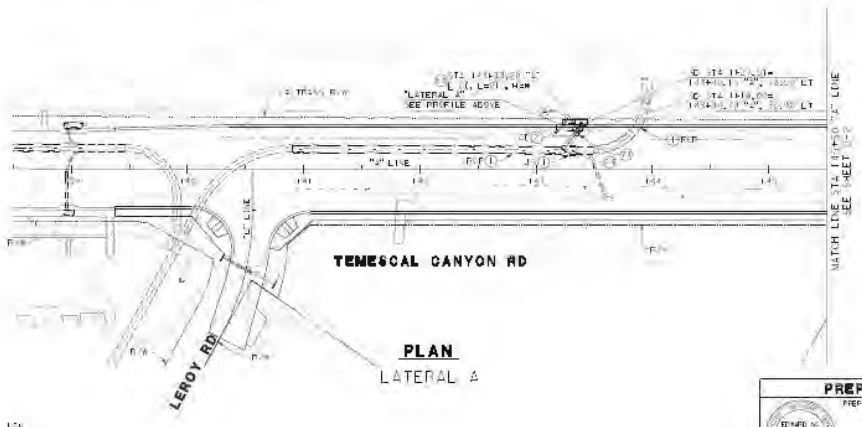


CONSTRUCTION NOTES:

(1) PROTECT IN PLACE
(2) REMOVE
(3) ADJUST MANHOLE TO GRADE
(4) CONSTRUCT CURB INLET PER COUNTY STD NO. 300, WITH CONNECTING PIPE (MIN 8" DIAM.)
(5) INSTALL 42" RCP (C-[illegible])
(6) CONSTRUCT CONCRETE FILLWAY PER DETAIL ON SHEET XX

STORM DRAIN CURVE/LINE DATA

NO.	BEARING/DELTA	RADIUS	LENGTH	TANGENT
(2)	N81°0'02"W	-----	27.51	-----



PLAN
LATERAL A

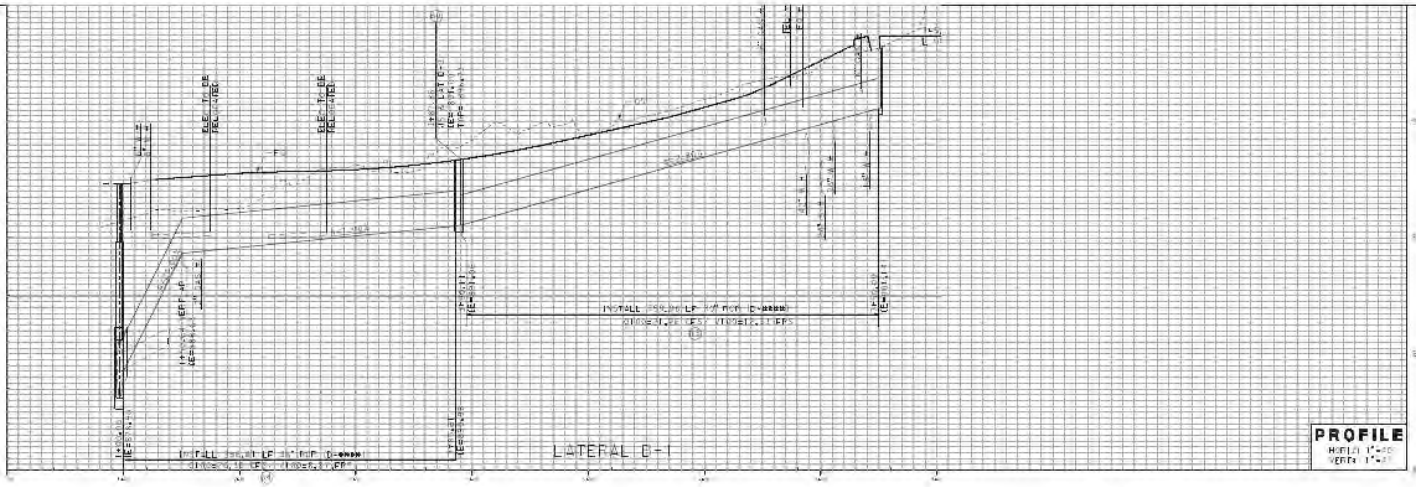
PREPARED BY	DRAINAGE PLAN & PROFILE	SHEET No.
PREPARED UNDER THE SUPERVISION OF:	TEMESCAL CANYON RD	D-1
REGISTERED ENGINEER	LEROY RD TO DOS LAGOS DR	SHEET 15 OF XX
PROJECT MANAGER	"A" LINE STA 138+50 TO 145+50	
DATE		

WATERSHED: [illegible]
DFA FILE #: [illegible]
WO: 30-0800
COUNTY FILE No.:

DATE PLOTTED = [illegible]
TIME PLOTTED = [illegible]

ORIGINAL SCALE: 1" = [illegible]

ENGINEER'S SEAL

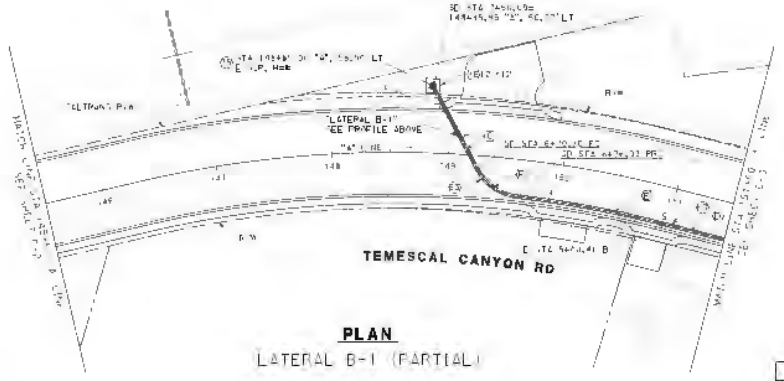


CONSTRUCTION NOTES:

(2) INSTALL 30" RCP (C-[illegible])
(4) INSTALL 18" RCP (C-[illegible])
(5) INSTALL GRATED CONCRETE PIPE INLET PER [illegible]
NO PLAN DRAIN WITH CONCRETE PIPE TRASH SCREEN
(9) CONSTRUCT CONCRETE APRON PER DETAIL ON SHEET XX

STORM DRAIN CURVE/LINE DATA

NO.	DELTA/BRG/DELTA	RADIUS	LENGTH	TANGENT
C1	90°17'39"E	-----	29.62'	-----
C2	7°49'47"	324.00'	44.26'	22.16'
C3	25°17'06"	150.00'	66.20'	33.67'
C4	S87°11'27"W	-----	81.33'	-----

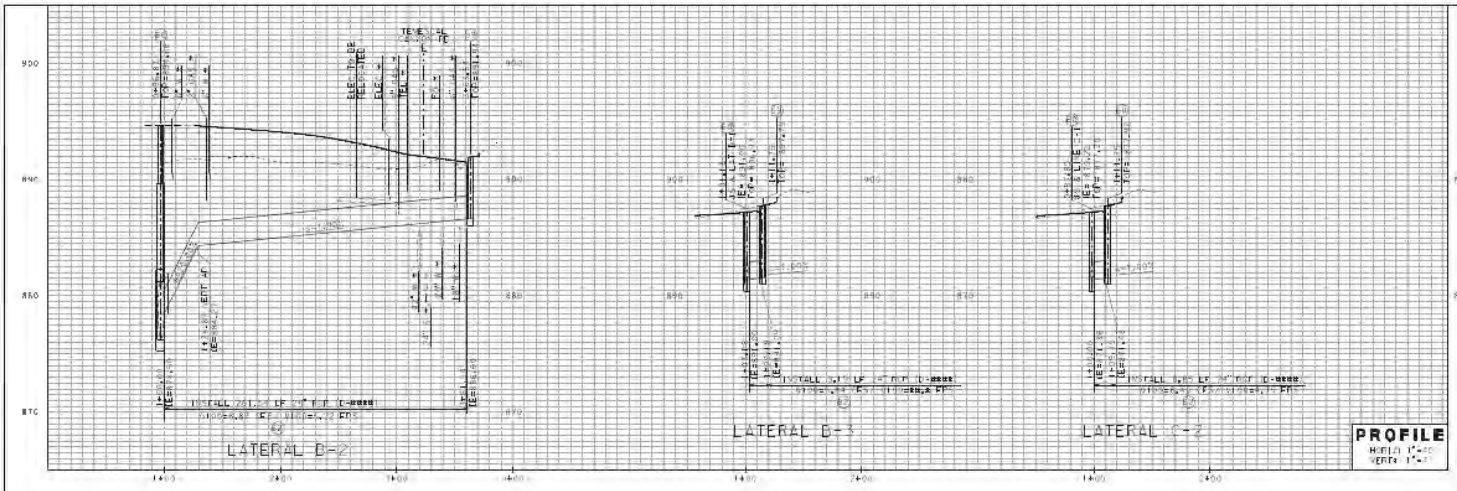


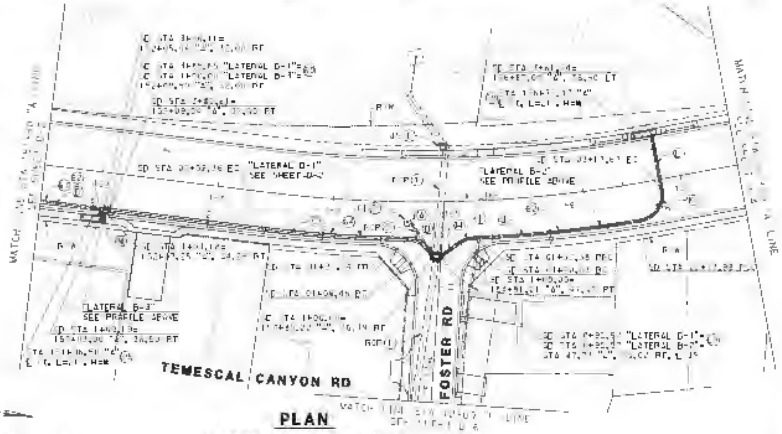
PLAN
LATERAL B-1 (PARTIAL)

SCALE: 1" = [illegible]

PREPARED BY	DRAINAGE PLAN & PROFILE	SHEET No.
PREPARED UNDER THE SUPERVISION OF: [illegible]	TEMESCAL CANYON RD LEROY RD TO DOS LAGOS DR "A" LINE STA 145+50 TO 191+50	D-2 SHEET 16 OF XX

DESIGNED [illegible] DRAWN [illegible] CHECKED [illegible]
QUANTITIES [illegible] DWG FILE [illegible]
WO 08-0869
COUNTY FILE No.





PLAN

LATERALS B-1 & D-2
AND D-2 (ALT)

CONSTRUCTION NOTES:

1. PROTECT IN PLACE
2. REMOVE
3. CONSTRUCT CURB INLET PER CALTRANS STD. NO. 3006 WITH CONNECTING PIPE (MATCH EXISTING)
4. CONSTRUCT JUNCTION STRUCTURE PER CALTRANS STD. PLAN D75A
5. INSTALL 24" RCP (D-####)
6. INSTALL 30" RCP (D-####)
7. INSTALL 36" RCP (D-####)

STORM DRAIN CURVE/LINE DATA

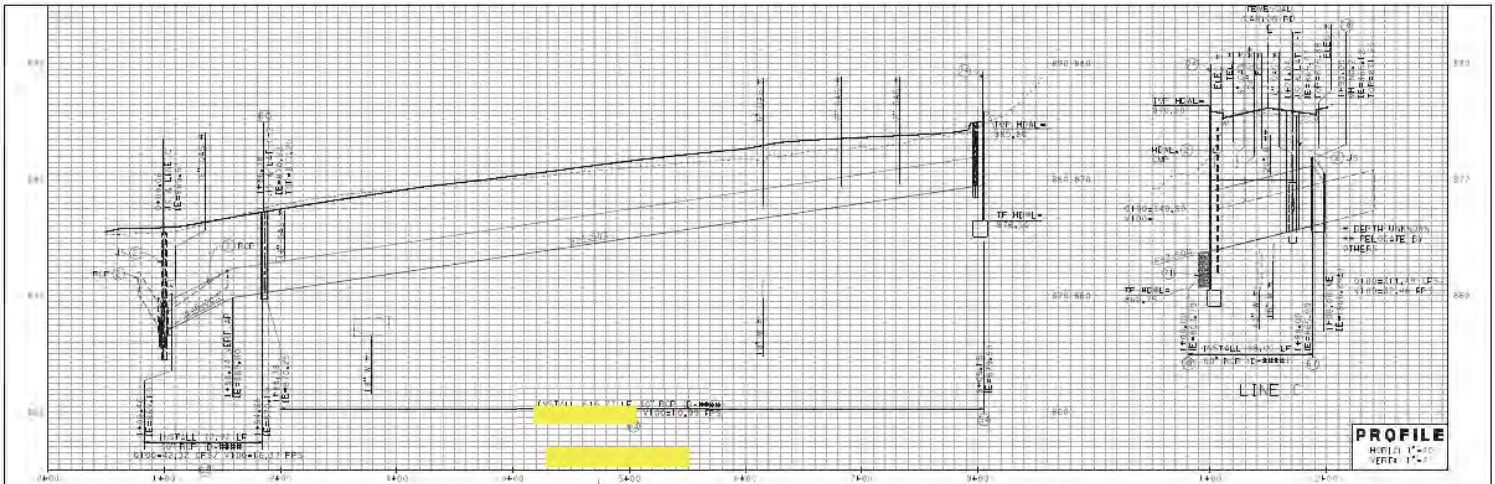
NO.	BEARING/DELTA	RADIUS	LENGTH	TANGENT
(1)	S48°33'29"W	----	10.76'	----
(2)	52°06'08"	22.50'	20.45'	11.02'
(3)	S89°54'37"W	111.00'	173.97'	89.28'
(4)	S00°11'39"E	----	248.04'	----
(5)	SEE SHEET D-3 FOR DATA			
(6)	SEE SHEET D-3 FOR DATA			
(7)	SEE SHEET D-3 FOR DATA			
(8)	S47°48'17"W	----	26.30'	----
(9)	37°58'28"	72.00'	47.72'	24.80'
(10)	89°52'08"	111.00'	144.91'	90.49'
(11)	90°52'36"	22.50'	35.69'	22.80'
(12)	S77°00'29"W	----	91.87'	----
(13)	S48°33'29"E	----	9.19'	----

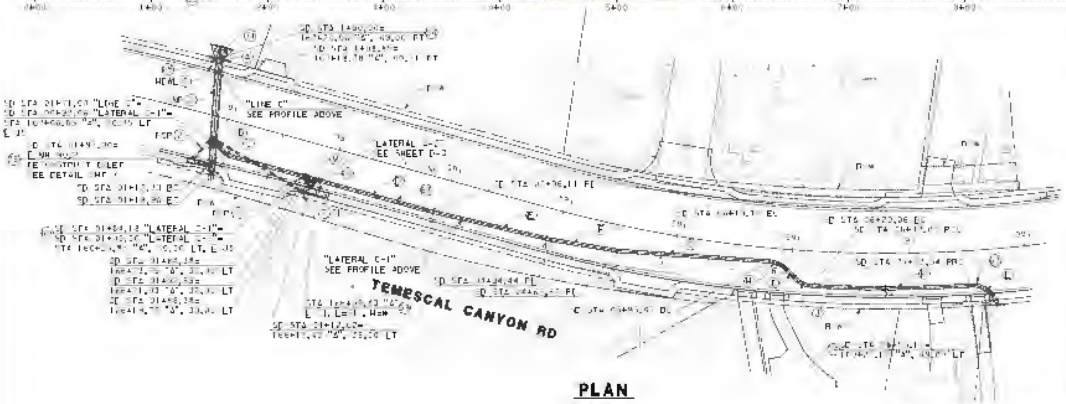
PREPARED BY	DRAINAGE PLAN & PROFILE	SHEET No.
PREPARED UNDER THE SUPERVISION OF:	TEMESCAL CANYON RD	D-3
REGISTERED ENGINEER	LEROY RD TO DOS LAGOS DR	sheet 1 of XX
DATE	"A" LINE STA 151+50 TO 157+50	

USERNAME =	WO 08-0060	COUNTY FILE No.
DGN FILE =		

DATE PLOTTED = 10/24/11
TIME PLOTTED = 08:38:11

DIVIDER LAST REVISED





PLAN
LINE C

CONSTRUCTION NOTES:

1. PROTECT IN PLACE
2. REMOVE
3. INSTALL TYPE "R" INLET PER CALTRANS STD. PLAN D87
4. INSTALL TYPE "R" INLET PER CALTRANS STD. PLAN D87 WITH CONNECTOR PIPE (MATCH EXISTING)
5. INSTALL MANHOLE (CITY TYPE) PER CALTRANS STD. PLAN D74
6. INSTALL 18" RCP (C-UNDER)
7. INSTALL 24" RCP (C-UNDER)
8. INSTALL 42" RCP (C-UNDER)
9. INSTALL 42" (TYP.) (1.5:1) PIPER
10. INSTALL ROCK SLOPE PROTECTION (TYP.) (METHOD B)
11. CONSTRUCT METAL BEAM BARRIER PER CALTRANS STD. PLAN

CURVE/LINE DATA

NO.	BEARING/DELTA	RADIUS	LENGTH	TANGENT
(A)	S46°31'49"W	----	11.13	----
(B)	S41°31'49"W	----	13.28	----
(C)	33°27'15"	11.00	6.57	3.38
(D)	S08°04'34"W	----	17.21	----
(E)	S07°56'15"W	----	108.21	----
(F)	S02°06'19"W	----	38.77	----
(G)	S03°19'12"E	----	130.20	----
(H)	43°17'27"	20.00	15.67	8.21
(I)	S39°57'39"W	----	9.82	----
(J)	43°17'33"	20.00	15.67	8.21
(K)	06°55'12"	1110.00	134.11	67.13
(L)	89°29'54"	20.00	31.23	19.83
(M)	S23°04'07"W	----	12.02	----

PREPARED BY
PREPARED UNDER THE SUPERVISION OF:
REGISTERED ENGINEER
DATE
NAME (PRINT)
TITLE
FIRM NAME, FIRM ADDR, CITY, STATE, ZIP CODE
TELEPHONE NO.

DRAINAGE PLAN & PROFILE
TEMESCAL CANYON RD
LEROY RD TO DOS LAGOS DR
"A" LINE STA 157+50 TO 164+50

SHEET No.
D-4
SHEET 18 OF XX

SCALE: 1" = 40'

WO 08-0069

COUNTY FILE No.

DATE PLOTTED = 10/29/2010
FILE PLOTTED = C:\Projects\08-0069\Drainage\Plans\D-4.dgn

DATE PLOTTED = [illegible]

APPENDIX E

HYDRAULIC CALCULATIONS, PIPE ELEMENTS AND INLETS

PIPE ELEMENTS - HELE1

Node 12-13	6" DIA, Q=0.32CFS	s=0.00769	
Node 13-16	6" DIA, Q=0.44CFS	s=0.00756	
Node 16-20	12" DIA, Q=1.50CFS	s=0.0200	
Node 18-20	6" DIA, Q=0.25CFS	s=0.0091	
Node 20-21	12" DIA, Q=2.16CFS	s=0.0178	
NODE 21-61	9" DIA, Q=2.27CFS	s=0.110	
Node 61-64	12" DIA, Q=2.66CFS	s=0.0142	
Node 63-64	6" DIA, Q=0.16CFS	s=0.0200	
Node 64-65	12" DIA, Q=2.80CFS	s=0.010	
Node 65-66	12" DIA, Q=3.08 CFS	s=0.010	
Node 56-59	6" DIA, Q=0.21 CFS	s=0.010	
NODE 52-53	6" DIA, Q=0.20 CFS	s=0.020	
NODE 53-59	6" DIA, Q=0.31 CFS	s=0.0109	
NODE 55 -56	6" DIA, Q=0.13 CFS	s=0.00545	
NODE 56 -59	6" DIAM, Q=0.21 CFS	S=0.010	
NODE 59-66	12"' DIA, Q=0.77 CFS	s=0.0091	
NODE 66-103	12" DIA, Q=3.08 CFS	s=0.050	
NODE 102-103	24" DIA, Q=18.09 CFS	s=0.0111	LINE B
NODE 103-104	24" DIA, Q=21.02 CFS	s=0.0388	LINE B
NODE 91-104	24" DIA, Q=12.83 CFS	s=0.0739	LINE A

GRATE INLETS – HEC-22 -SUMPS

INLET AT NODE 16, Q=0.44 CFS

INLET AT NODE 20, Q=0.28 CFS

INLET AT NODE 21, Q=0.11 CFS

INLET AT NODE 61, Q=0.42CFS

INLET AT NODE 65, Q=0.30 CFS

INLET AT NODE 59, Q=0.32 CFS

****

Node 12-13 PIPE ELEMENT

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 0.500

PIPE SLOPE(FEET/FEET) = 0.0077

PIPEFLOW(CFS) = 0.32

MANNINGS FRICTION FACTOR = 0.009000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.29

CRITICAL FLOW AREA(SQUARE FEET) = 0.116

CRITICAL FLOW TOP-WIDTH(FEET) = 0.495

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 2.43

CRITICAL FLOW VELOCITY(FEET/SEC.) = 2.751

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.12

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.24

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.40

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.24

FLOW AREA(SQUARE FEET) = 0.09

FLOW TOP-WIDTH(FEET) = 0.499

FLOW PRESSURE + MOMENTUM(POUNDS) = 2.75

FLOW VELOCITY(FEET/SEC.) = 3.525

FLOW VELOCITY HEAD(FEET) = 0.193

HYDRAULIC DEPTH(FEET) = 0.18

FROUDE NUMBER = 1.457

SPECIFIC ENERGY(FEET) = 0.43

==========

NODE 13-16 PIPE ELEMENT

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 0.500

PIPE SLOPE(FEET/FEET) = 0.0076

PIPEFLOW(CFS) = 0.44

MANNINGS FRICTION FACTOR = 0.009000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.34

CRITICAL FLOW AREA(SQUARE FEET) = 0.141

CRITICAL FLOW TOP-WIDTH(FEET) = 0.468

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 3.53

CRITICAL FLOW VELOCITY(FEET/SEC.) = 3.116

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.15

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.30

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.49

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.29

FLOW AREA(SQUARE FEET) = 0.12

FLOW TOP-WIDTH(FEET) = 0.495

FLOW PRESSURE + MOMENTUM(POUNDS) = 3.95

FLOW VELOCITY(FEET/SEC.) = 3.786

FLOW VELOCITY HEAD(FEET) = 0.223

HYDRAULIC DEPTH(FEET) = 0.23

FROUDE NUMBER = 1.377

SPECIFIC ENERGY(FEET) = 0.51

==========

NODE 16-20 – PIPE ELEMENT

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 1.000

PIPE SLOPE(FEET/FEET) = 0.0200

PIPEFLOW(CFS) = 1.50

MANNINGS FRICTION FACTOR = 0.012000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.52

CRITICAL FLOW AREA(SQUARE FEET) = 0.412

CRITICAL FLOW TOP-WIDTH(FEET) = 0.999

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 16.26

CRITICAL FLOW VELOCITY(FEET/SEC.) = 3.643

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.21

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.41

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.73

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.36

FLOW AREA (SQUARE FEET) = 0.25

FLOW TOP-WIDTH(FEET) = 0.959

FLOW PRESSURE + MOMENTUM(POUNDS) = 19.60

FLOW VELOCITY(FEET/SEC.) = 5.931

FLOW VELOCITY HEAD(FEET) = 0.546

HYDRAULIC DEPTH(FEET) = 0.26

FROUDE NUMBER = 2.035

SPECIFIC ENERGY(FEET) = 0.90

==========

NODE 20-21 – PIPE ELEMENT

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 1.000

PIPE SLOPE(FEET/FEET) = 0.0178

PIPEFLOW(CFS) = 2.16

MANNINGS FRICTION FACTOR = 0.012000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.63

CRITICAL FLOW AREA(SQUARE FEET) = 0.519

CRITICAL FLOW TOP-WIDTH(FEET) = 0.967

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 26.26

CRITICAL FLOW VELOCITY(FEET/SEC.) = 4.159

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.27

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.54

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.90

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.45

FLOW AREA(SQUARE FEET) = 0.34

FLOW TOP-WIDTH(FEET) = 0.995

FLOW PRESSURE + MOMENTUM(POUNDS) = 30.33

FLOW VELOCITY(FEET/SEC.) = 6.269

FLOW VELOCITY HEAD(FEET) = 0.610

HYDRAULIC DEPTH(FEET) = 0.35

FROUDE NUMBER = 1.878

SPECIFIC ENERGY(FEET) = 1.06

==========

NODE 21-61 – PIPE ELEMENT

****

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 1.000

PIPE SLOPE(FEET/FEET) = 0.1100

PIPEFLOW(CFS) = 2.30

MANNINGS FRICTION FACTOR = 0.012000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.65

CRITICAL FLOW AREA (SQUARE FEET) = 0.539

CRITICAL FLOW TOP-WIDTH(FEET) = 0.955

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 28.55

CRITICAL FLOW VELOCITY(FEET/SEC.) = 4.265

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.28

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.56

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.93

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.29

FLOW AREA (SQUARE FEET) = 0.19

FLOW TOP-WIDTH(FEET) = 0.905

FLOW PRESSURE + MOMENTUM(POUNDS) = 56.41

FLOW VELOCITY(FEET/SEC.) = 12.345

FLOW VELOCITY HEAD(FEET) = 2.366

HYDRAULIC DEPTH(FEET) = 0.21

FROUDE NUMBER = 4.794

SPECIFIC ENERGY(FEET) = 2.65

==========

NODE 61-64 – PIPE ELEMENT

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 1.000

PIPE SLOPE(FEET/FEET) = 0.0142

PIPEFLOW(CFS) = 2.66

MANNINGS FRICTION FACTOR = 0.012000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.70

CRITICAL FLOW AREA(SQUARE FEET) = 0.586

CRITICAL FLOW TOP-WIDTH(FEET) = 0.917

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 34.67

CRITICAL FLOW VELOCITY(FEET/SEC.) = 4.537

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.32

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.64

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 1.02

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.55

FLOW AREA(SQUARE FEET) = 0.44

FLOW TOP-WIDTH(FEET) = 0.996

FLOW PRESSURE + MOMENTUM(POUNDS) = 37.64

FLOW VELOCITY(FEET/SEC.) = 6.068

FLOW VELOCITY HEAD(FEET) = 0.572

HYDRAULIC DEPTH(FEET) = 0.44

FROUDE NUMBER = 1.612

SPECIFIC ENERGY(FEET) = 1.12

==========

NODE 64-65 – PIPE ELEMENT

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 1.000

PIPE SLOPE(FEET/FEET) = 0.0100

PIPEFLOW(CFS) = 2.80

MANNINGS FRICTION FACTOR = 0.012000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.72

CRITICAL FLOW AREA(SQUARE FEET) = 0.603

CRITICAL FLOW TOP-WIDTH(FEET) = 0.901

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 37.15

CRITICAL FLOW VELOCITY(FEET/SEC.) = 4.643

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.33

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.67

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 1.05

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.63

FLOW AREA(SQUARE FEET) = 0.52

FLOW TOP-WIDTH(FEET) = 0.965

FLOW PRESSURE + MOMENTUM(POUNDS) = 38.03

FLOW VELOCITY(FEET/SEC.) = S.357

FLOW VELOCITY HEAD(FEET) = 0.446

HYDRAULIC DEPTH(FEET) = 0.S4

FROUDE NUMBER = 1.283

SPECIFIC ENERGY(FEET) = 1.08

==========

NODE 65-66 – PIPE ELEMENT

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 1.000

PIPE SLOPE(FEET/FEET) = 0.0100

PIPEFLOW(CFS) = 3.08

MANNINGS FRICTION FACTOR = 0.012000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.75

CRITICAL FLOW AREA(SQUARE FEET) = 0.634

CRITICAL FLOW TOP-WIDTH(FEET) = 0.864

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 42.35

CRITICAL FLOW VELOCITY(FEET/SEC.) = 4.861

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.37

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.73

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 1.12

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.68

FLOW AREA(SQUARE FEET) = 0.56

FLOW TOP-WIDTH(FEET) = 0.937

FLOW PRESSURE + MOMENTUM(POUNDS) = 43.02

FLOW VELOCITY(FEET/SEC.) = 5.457

FLOW VELOCITY HEAD(FEET) = 0.462

HYDRAULIC DEPTH(FEET) = 0.60

FROUDE NUMBER = 1.239

SPECIFIC ENERGY(FEET) = 1.14

==========

NODE ELEMENT 56-59 – PIPE ELEMENT

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 0.500

PIPE SLOPE(FEET/FEET) = 0.0100

PIPEFLOW(CFS) = 0.21

MANNINGS FRICTION FACTOR = 0.009000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.23

CRITICAL FLOW AREA(SQUARE FEET) = 0.088

CRITICAL FLOW TOP-WIDTH(FEET) = 0.498

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 1.50

CRITICAL FLOW VELOCITY(FEET/SEC.) = 2.385

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.09

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.18

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.32

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.17

FLOW AREA(SQUARE FEET) = 0.06

FLOW TOP-WIDTH(FEET) = 0.476

FLOW PRESSURE + MOMENTUM(POUNDS) = 1.68

FLOW VELOCITY(FEET/SEC.) = 3.466

FLOW VELOCITY HEAD(FEET) = 0.186

HYDRAULIC DEPTH(FEET) = 0.13

FROUDE NUMBER = 1.712

SPECIFIC ENERGY(FEET) = 0.36

==========

NODE 53-59 -PIPE ELEMENT

****

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 0.500

PIPE SLOPE(FEET/FEET) = 0.0109

PIPEFLOW(CFS) = 0.31

MANNINGS FRICTION FACTOR = 0.009000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.28

CRITICAL FLOW AREA(SQUARE FEET) = 0.114

CRITICAL FLOW TOP-WIDTH(FEET) = 0.496

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 2.16

CRITICAL FLOW VELOCITY(FEET/SEC.) = 2.720

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.11

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.23

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.40

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.21

FLOW AREA(SQUARE FEET) = 0.08

FLOW TOP-WIDTH(FEET) = 0.493

FLOW PRESSURE + MOMENTUM(POUNDS) = 2.82

FLOW VELOCITY(FEET/SEC.) = 3.976

FLOW VELOCITY HEAD(FEET) = 0.245

HYDRAULIC DEPTH(FEET) = 0.16

FROUDE NUMBER = 1.763

SPECIFIC ENERGY(FEET) = 0.45

==========

NODE 55-56 – PIPE ELEMENT

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 0.500

PIPE SLOPE(FEET/FEET) = 0.0055

PIPEFLOW(CFS) = 0.13

MANNINGS FRICTION FACTOR = 0.009000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.18

CRITICAL FLOW AREA (SQUARE FEET) = 0.063

CRITICAL FLOW TOP-WIDTH(FEET) = 0.479

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 0.81

CRITICAL FLOW VELOCITY(FEET/SEC.) = 2.059

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.07

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.13

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.24

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.16

FLOW AREA (SQUARE FEET) = 0.05

FLOW TOP-WIDTH(FEET) = 0.465

FLOW PRESSURE + MOMENTUM(POUNDS) = 0.83

FLOW VELOCITY(FEET/SEC.) = 2.436

FLOW VELOCITY HEAD(FEET) = 0.092

HYDRAULIC DEPTH(FEET) = 0.11

FROUDE NUMBER = 1.267

SPECIFIC ENERGY(FEET) = 0.25

==========

NODE 59-66 – PIPE ELEMENT

****

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 1.000

PIPE SLOPE(FEET/FEET) = 0.0091

PIPEFLOW(CFS) = 0.77

MANNINGS FRICTION FACTOR = 0.009000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.37

CRITICAL FLOW AREA (SQUARE FEET) = 0.261

CRITICAL FLOW TOP-WIDTH(FEET) = 0.964

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 6.89

CRITICAL FLOW VELOCITY(FEET/SEC.) = 2.952

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.14

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.27

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 0.50

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.27

FLOW AREA (SQUARE FEET) = 0.17

FLOW TOP-WIDTH(FEET) = 0.886

FLOW PRESSURE + MOMENTUM(POUNDS) = 7.97

FLOW VELOCITY(FEET/SEC.) = 4.554

FLOW VELOCITY HEAD(FEET) = 0.322

HYDRAULIC DEPTH(FEET) = 0.19

FROUDE NUMBER = 1.837

SPECIFIC ENERGY(FEET) = 0.59

==========

NODE 66-103 – PIPE ELEMENT

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 1.000

PIPE SLOPE(FEET/FEET) = 0.0500

PIPEFLOW(CFS) = 3.08

MANNINGS FRICTION FACTOR = 0.012000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 0.75

CRITICAL FLOW AREA(SQUARE FEET) = 0.634

CRITICAL FLOW TOP-WIDTH(FEET) = 0.864

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 42.35

CRITICAL FLOW VELOCITY(FEET/SEC.) = 4.861

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.37

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 0.73

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 1.12

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.41

FLOW AREA(SQUARE FEET) = 0.31

FLOW TOP-WIDTH(FEET) = 0.985

FLOW PRESSURE + MOMENTUM(POUNDS) = 63.39

FLOW VELOCITY(FEET/SEC.) = 10.068

FLOW VELOCITY HEAD(FEET) = 1.S74

HYDRAULIC DEPTH(FEET) = 0.31

FROUDE NUMBER = 3.183

SPECIFIC ENERGY(FEET) = 1.99

==========

NODE 102-103 – PIPE ELEMENT – LINE 'B'

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 2.000

PIPE SLOPE(FEET/FEET) = 0.0110

PIPEFLOW(CFS) = 18.09

MANNINGS FRICTION FACTOR = 0.013000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 1.53

CRITICAL FLOW AREA(SQUARE FEET) = 2.582

CRITICAL FLOW TOP-WIDTH(FEET) = 1.694

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 356.76

CRITICAL FLOW VELOCITY(FEET/SEC.) = 7.006

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.76

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 1.52

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 2.29

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 1.31

FLOW AREA(SQUARE FEET) = 2.18

FLOW TOP-WIDTH(FEET) = 1.903

FLOW PRESSURE + MOMENTUM(POUNDS) = 369.10

FLOW VELOCITY(FEET/SEC.) = 8.315

FLOW VELOCITY HEAD(FEET) = 1.074

HYDRAULIC DEPTH(FEET) = 1.14

FROUDE NUMBER = 1.371

SPECIFIC ENERGY(FEET) = 2.38

==========

NODE 103 – 104 – PIPE ELEMENT – LINE 'B'

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 2.000

PIPE SLOPE(FEET/FEET) = 0.0388

PIPEFLOW(CFS) = 21.02

MANNINGS FRICTION FACTOR = 0.013000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 1.64

CRITICAL FLOW AREA(SQUARE FEET) = 2.760

CRITICAL FLOW TOP-WIDTH(FEET) = 1.533

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 439.82

CRITICAL FLOW VELOCITY(FEET/SEC.) = 7.615

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.90

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 1.80

CRITICAL FLOW SPECIFIC ENERGY(FEET) = 2.54

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.97

FLOW AREA(SQUARE FEET) = 1.50

FLOW TOP-WIDTH(FEET) = 1.999

FLOW PRESSURE + MOMENTUM(POUNDS) = 607.75

FLOW VELOCITY(FEET/SEC.) = 13.978

FLOW VELOCITY HEAD(FEET) = 3.034

HYDRAULIC DEPTH(FEET) = 0.75

FROUDE NUMBER = 2.840

SPECIFIC ENERGY(FEET) = 4.00

==========

NODE 91-104 – PIPE ELEMENT – LINE 'A'

>>>>PIPEFLOW HYDRAULIC INPUT INFORMATION<<<<

PIPE DIAMETER(FEET) = 2.000

PIPE SLOPE(FEET/FEET) = 0.0739

PIPEFLOW(CFS) = 12.83

MANNINGS FRICTION FACTOR = 0.013000

==========

CRITICAL-DEPTH FLOW INFORMATION:

CRITICAL DEPTH(FEET) = 1.29

CRITICAL FLOW AREA(SQUARE FEET) = 2.139

CRITICAL FLOW TOP-WIDTH(FEET) = 1.915

CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) = 224.15

CRITICAL FLOW VELOCITY(FEET/SEC.) = 5.997

CRITICAL FLOW VELOCITY HEAD(FEET) = 0.56

CRITICAL FLOW HYDRAULIC DEPTH(FEET) = 1.12

CRITICAL FLOW 5PECIFIC ENERGY(FEET) = 1.85

==========

NORMAL-DEPTH FLOW INFORMATION:

NORMAL DEPTH(FEET) = 0.62

FLOW AREA(SQUARE FEET) = 0.83

FLOW TOP-WIDTH(FEET) = 1.850

FLOW PRESSURE + MOMENTUM(POUNDS) = 397.91

FLOW VELOCITY(FEET/SEC.) = 15.466

FLOW VELOCITY HEAD(FEET) = 3.714

HYDRAULIC DEPTH(FEET) = 0.45

FROUDE NUMBER = 4.070

SPECIFIC ENERGY(FEET) = 4.33

==========

Worksheet for Grate Inlet in Sag - 12"x12", Q = 0.42 cfs (Node 61)

Project Description

Solve For	Spread

Input Data

Discharge		0.42	ft^3/s
Gutter Width		3.00	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Grate Width		1.00	ft
Grate Length		1.00	ft
Local Depression		1.00	in
Local Depression Width		2.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		50.00	%

Results

Spread	6.62	ft
Depth	0.13	ft
Gutter Depression	0.00	ft
Total Depression	0.08	ft
Open Grate Area	0.45	ft^2
Active Grate Weir Length	2.00	ft

Worksheet for Grate Inlet in Sag - 12"x12", Q = 0.32 cfs (Node 59)

Project Description

Solve For	Spread

Input Data

Discharge		0.32	ft^3/s
Gutter Width		3.00	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Grate Width		1.00	ft
Grate Length		1.00	ft
Local Depression		1.00	in
Local Depression Width		2.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		50.00	%

Results

Spread	5.21	ft
Depth	0.10	ft
Gutter Depression	0.00	ft
Total Depression	0.08	ft
Open Grate Area	0.45	ft^2
Active Grate Weir Length	2.00	ft

Worksheet for Grate Inlet in Sag - 12"x12", Q = 0.28 cfs (Node 20)

Project Description

Solve For	Spread

Input Data

Discharge		0.28	ft^3/s
Gutter Width		3.00	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Grate Width		1.00	ft
Grate Length		1.00	ft
Local Depression		1.00	in
Local Depression Width		2.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		50.00	%

Results

Spread	4.60	ft
Depth	0.09	ft
Gutter Depression	0.00	ft
Total Depression	0.08	ft
Open Grate Area	0.45	ft^2
Active Grate Weir Length	2.00	ft

Worksheet for Grate Inlet In Sag - 12"x12", Q = 0.11 cfs (Node 21)

Project Description

Solve For	Spread

Input Data

Discharge		0.11	ft^3/s
Gutter Width		3.00	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Grate Width		1.00	ft
Grate Length		1.00	ft
Local Depression		1.00	in
Local Depression Width		2.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		50.00	%

Results

Spread	1.86	ft
Depth	0.03	ft
Gutter Depression	0.00	ft
Total Depression	0.08	ft
Open Grate Area	0.45	ft^2
Active Grate Weir Length	2.00	ft