CA ENGINEERING, INC.

Planning • Engineering • Surveying

PRELIMINARY HYDROLOGY REPORT

FOR

18060 SLOVER AVENUE INDUSTRIAL PROJECT

10486 Locust Avenue & 18060 Slover Avenue
Bloomington, California 92316

Date: September 19, 2022

PLANS PREPARED UNDER THE SUPERVISION OF:

Fred Cornwell, P.E. - R.C.E 45591 Date

Table of Contents

1.0 INTRODUCTION

The purpose of this report is to present the hydrology analysis and drainage calculations for a proposed Locust Ave. industrial development located at 10486 Locust Avenue & 18060 Slover Avenue, within an unincorporated area of San Bernardino County. The site proposes to construct an industrial building with an approximately 40,708 square feet square feet footprint on approximately 2.19 net acres. This report will determine the existing and proposed storm water runoff rates from the Project site, provide analysis of the impacts to adjacent and downstream properties and facilities, and determine how to protect the building from 100-yr flood. This project is considered an "Industrial/Commercial Development".

2.0 EXISTING DRAINAGE CONDITIONS

The subject site consists of four parcels, one of which is occupied by a single-family residence with storage sheds; while the other three are dirt covered vacant lots that are used for truck parking. The site is bounded by a pallet storage yard to the north, a large distribution warehouse to the west, Locust Avenue to the east, and Slover Avenue to the south. To the east of Locust Avenue is a residential home, and a vacant lot. To the south of Slover avenue is a newly developed Amazon industrial warehouse.

The site is relatively flat with an elevation of approximately 1,080 feet above mean sea level (msl), and a slight slope to the south of about 1.5%. The site currently drains onto Slover Avenue which does not have an existing storm drain system. The existing wall on the northerly property line prevents the acceptance of any offsite drainage.

3.0 PROPOSED DRAINAGE CONDITIONS

Drainage for the proposed site will be conveyed via sheet flow and gutters to one of five proposed catch basins that will connect to a subsurface infiltration system that starts at the northern drive aisle and wraps around the easterly and southern portion of the proposed building. The catch basins will have filter inserts installed to remove sediment, debris, and other pollutants of concern from the storm flows prior to the flows being infiltrated. The infiltration system will consist of a 175 foot long, 96 inch perforated CMP pipe placed on a 10 foot wide gravel bed.

Per the county drainage requirements the infiltration system will be sized to retain the difference in volume between the proposed condition and the existing condition for the 100 year storm. Existing and proposed hydrographs for the 100 year storm can be found in Appendix "C."

Storm flows that exceed the capacity of the infiltration system will bubble out of the infiltration system through a proposed curb inlet catch basin on Slover Ave. The catch basin will be designed to prevent any offsite flows from coming onto the subject site.

4.0 HYDROLOGICAL AND SOIL DATA

References used in this report were the following:

- San Bernardino County Flood Control District, Hydrology Manual, dated August 1986.
- NOAA Atlas 14, Volume 6, Version 2, Point Precipitation Frequency Estimates.

Based on the Stormwater Facility Mapping tool for San Bernardino County, the hydrological soils group designation the site consists of soil group "A". The soil group designation is presented in the mapping tool image found in Section 13.0.

- Slope of Intensity Duration Curve = 0.6

The point precipitation frequency estimates for the project site are presented in Section 13.0.

5.0 HYDROLOGY RESULTS

The results of the 2, 25 and 100-year storm events for both the existing and proposed conditions are shown on the hydrology maps in this report. We have also prepared a unit hydrograph for the existing and proposed 100 year storm events. The infiltration system is sized to store and treat the difference in volume between the two hydrographs.

6.0 WATER QUALITY

The water quality as shown in the project's WQMP and described Section 3.0, will utilize the inlet filters and infiltration facility as the water quality BMP's. More information on the water quality is shown on the WQMP Site Plan (Exhibit D)

7.0 FLOOD PLAIN DESIGNATION

The site falls within a Zone "X" designation under the FEMA Map 06071C8658H, dated August 28, 2008. Zone X (Shaded) represents areas determined to be outside the 0.2% annual chance floodplain.

8.0 METHODOLOGY

The San Bernardino County Rational and Unit Hydrograph Methods described in the San Bernardino County Hydrology Manual were utilized to determine the storm flows. The San Bernardino County Unit Hydrograph Method was used to provide hydrological information for routing of the proposed basin. The Computer Software Programs used was Advanced Engineering Software (AES) Rational Tabling Version 15.0 for the Rational Method and the small area hydrograph module CH1 – v1.8 for the Hydrographs to size the basin. Existing and proposed hydrographs for the 100 year storm can be found in Appendix "C."

This report will analyze the 2, 25 & 100 year storms for the Rational Method. Results of the Rational Method output can be found in Appendix "A" (existing) and Appendix "B" (proposed).

9.0 HYDRAULICS

The on-site storm drain system was analyzed utilizing the 100 year storm flows as shown in the rational method hydrology map. We will use the exit flow (node 12, 10.52 cfs) and the proposed slope of the 48" outlet pipe that connects to the infiltration pipe to the proposed catch basin (s = 0.020) to determine if the overflow pipe has capacity to convey the flow. The hydraulics of all the pipes will be analyzed during the final engineering once the profiles can be established.

The infiltration facility consists of a 175 foot long, 96 inch perforated CMP pipe placed on a 10 foot wide gravel bed. During a large storm event flows will bubble out of the infiltration system through a proposed curb inlet catch basin on Slover Ave. The catch basin inlet will be above the top of the infiltration pipe to allow the flows to completely fill the pipe during storm events before overflowing. The catch basin will be designed to prevent any offsite flows from coming onto the subject site.

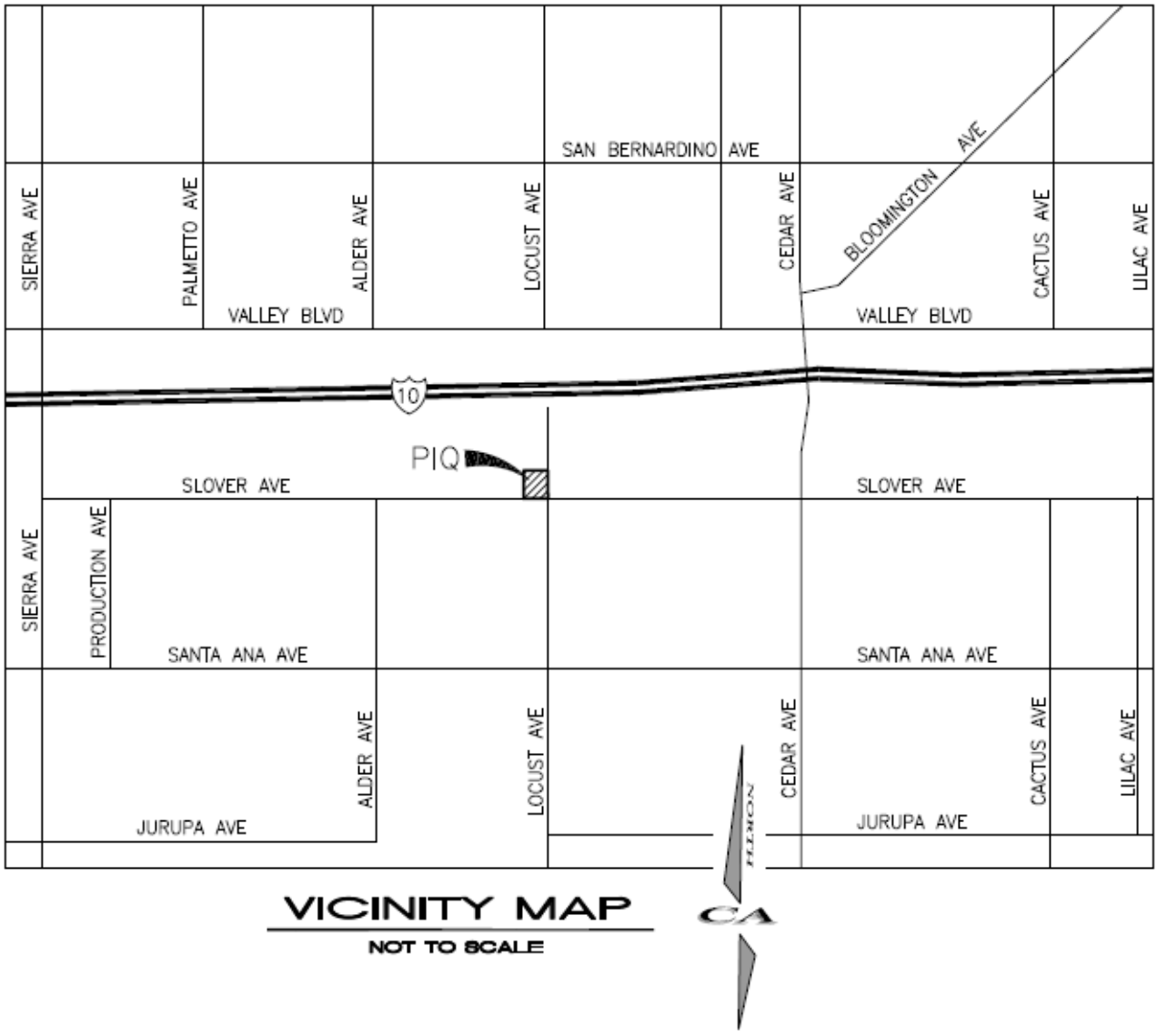
The pipe flows and catch basin hydraulics will be analyzed using the rational method flows in the Final

Hydrology report.

10.0 RESULTS & CONCLUSION

The infiltration system is sized to retain the difference in volume between the proposed condition and the existing condition for the 100 year storm. Existing and proposed hydrographs for the 100 year storm can be found in Appendix "C." Storm flows that exceed the capacity of the infiltration system will bubble out of the infiltration system through a proposed curb inlet catch basin on Slover Ave.

11.0 VICINITY MAP



VICINITY MAP

NOT TO SCALE

12.0 SOIL AND RAINFALL DATA TABLES


STORMWATER FACILITY MAPPING TOOL
TOC
Find City
Bloomington
Locate
Clear
Clear All
Metadata
EHM
Santa Ana River
Non-EHM (low)
Non-EHM (medium)
Non-EHM (high)
Non-EHM (default-high)
2006 - 303d/TMDL
Water Storage Facility
Interim
Ultimate
Other
Drainage Area Boundaries
HCOC Exempt Areas
City Storm Drains
Ground Water Basins
Ground Water Contours
Septic
Plumes
Soils
Soils - Hydro Group A
Soils - Hydro Group B
Soils - Hydro Group C
Soils - Hydro Group D
Soils - No Hydro Group
As-Built Plans
Hydromod Field Observations
Habitat/Species
DELHI FINE SAND
TUJUNGA LOAMY SAND
HANFORD COARSE SANDY LOAM
0.1 Miles

NOAA Atlas 14, Volume 6, Version 2
Location name: Bloomington, California, USA*
Latitude: 34.0637°, Longitude: -117.4104°
Elevation: 1079.43 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.110** (0.092-0.134)	**0.143** (0.119-0.174)	**0.188** (0.156-0.228)	**0.225** (0.185-0.276)	**0.276** (0.220-0.351)	**0.318** (0.247-0.413)	**0.361** (0.274-0.481)	**0.407** (0.300-0.558)	**0.472** (0.333-0.675)	**0.525** (0.358-0.778)
10-min	**0.158** (0.132-0.192)	**0.206** (0.171-0.249)	**0.269** (0.223-0.327)	**0.322** (0.265-0.395)	**0.396** (0.315-0.504)	**0.455** (0.354-0.591)	**0.517** (0.392-0.689)	**0.583** (0.430-0.799)	**0.676** (0.477-0.968)	**0.752** (0.512-1.12)
15-min	**0.192** (0.160-0.232)	**0.249** (0.207-0.302)	**0.325** (0.270-0.396)	**0.389** (0.320-0.478)	**0.479** (0.381-0.609)	**0.551** (0.428-0.715)	**0.625** (0.474-0.833)	**0.705** (0.520-0.967)	**0.818** (0.577-1.17)	**0.910** (0.620-1.35)
30-min	**0.286** (0.238-0.346)	**0.371** (0.309-0.450)	**0.485** (0.402-0.590)	**0.581** (0.478-0.713)	**0.715** (0.568-0.908)	**0.822** (0.639-1.07)	**0.933** (0.708-1.24)	**1.05** (0.775-1.44)	**1.22** (0.861-1.75)	**1.36** (0.925-2.01)
60-min	**0.418** (0.349-0.507)	**0.543** (0.452-0.659)	**0.710** (0.589-0.864)	**0.850** (0.700-1.04)	**1.05** (0.832-1.33)	**1.20** (0.936-1.56)	**1.37** (1.04-1.82)	**1.54** (1.14-2.11)	**1.79** (1.26-2.56)	**1.99** (1.35-2.95)
2-hr	**0.616** (0.513-0.747)	**0.793** (0.660-0.962)	**1.03** (0.852-1.25)	**1.22** (1.00-1.50)	**1.48** (1.18-1.89)	**1.69** (1.31-2.19)	**1.90** (1.44-2.53)	**2.13** (1.57-2.92)	**2.44** (1.72-3.49)	**2.69** (1.83-3.98)
3-hr	**0.772** (0.643-0.936)	**0.991** (0.825-1.20)	**1.28** (1.06-1.56)	**1.51** (1.25-1.86)	**1.83** (1.46-2.33)	**2.08** (1.62-2.70)	**2.33** (1.77-3.11)	**2.60** (1.91-3.56)	**2.96** (2.09-4.24)	**3.25** (2.21-4.82)
6-hr	**1.10** (0.914-1.33)	**1.41** (1.17-1.71)	**1.81** (1.50-2.21)	**2.14** (1.76-2.63)	**2.58** (2.05-3.28)	**2.92** (2.27-3.79)	**3.26** (2.47-4.34)	**3.61** (2.66-4.94)	**4.08** (2.88-5.84)	**4.45** (3.03-6.60)
12-hr	**1.46** (1.22-1.77)	**1.89** (1.57-2.29)	**2.43** (2.02-2.96)	**2.87** (2.36-3.52)	**3.45** (2.74-4.39)	**3.89** (3.03-5.06)	**4.33** (3.29-5.77)	**4.78** (3.52-6.56)	**5.39** (3.80-7.71)	**5.85** (3.99-8.68)
24-hr	**1.96** (1.73-2.26)	**2.56** (2.26-2.95)	**3.32** (2.93-3.84)	**3.93** (3.44-4.59)	**4.74** (4.01-5.71)	**5.35** (4.44-6.58)	**5.96** (4.83-7.50)	**6.57** (5.18-8.51)	**7.39** (5.59-9.97)	**8.02** (5.87-11.2)
2-day	**2.38** (2.10-2.74)	**3.16** (2.80-3.65)	**4.18** (3.69-4.83)	**5.00** (4.37-5.83)	**6.09** (5.16-7.34)	**6.92** (5.74-8.51)	**7.76** (6.29-9.78)	**8.61** (6.79-11.2)	**9.77** (7.39-13.2)	**10.7** (7.79-14.9)
3-day	**2.55** (2.26-2.94)	**3.45** (3.05-3.98)	**4.62** (4.07-5.34)	**5.57** (4.87-6.50)	**6.87** (5.81-8.27)	**7.86** (6.52-9.67)	**8.87** (7.19-11.2)	**9.91** (7.81-12.8)	**11.3** (8.57-15.3)	**12.4** (9.10-17.3)
4-day	**2.74** (2.42-3.15)	**3.74** (3.31-4.32)	**5.06** (4.46-5.85)	**6.13** (5.36-7.15)	**7.60** (6.44-9.16)	**8.74** (7.25-10.8)	**9.90** (8.02-12.5)	**11.1** (8.76-14.4)	**12.8** (9.65-17.2)	**14.1** (10.3-19.6)
7-day	**3.13** (2.77-3.60)	**4.33** (3.82-4.99)	**5.90** (5.20-6.83)	**7.20** (6.30-8.39)	**8.98** (7.60-10.8)	**10.4** (8.60-12.7)	**11.8** (9.55-14.9)	**13.3** (10.5-17.2)	**15.3** (11.6-20.7)	**17.0** (12.4-23.7)
10-day	**3.40** (3.01-3.91)	**4.72** (4.18-5.45)	**6.48** (5.72-7.50)	**7.94** (6.94-9.26)	**9.94** (8.41-12.0)	**11.5** (9.55-14.2)	**13.1** (10.6-16.5)	**14.8** (11.7-19.2)	**17.2** (13.0-23.2)	**19.0** (13.9-26.6)
20-day	**4.10** (3.63-4.72)	**5.75** (5.09-6.64)	**7.97** (7.02-9.22)	**9.81** (8.58-11.4)	**12.4** (10.5-14.9)	**14.4** (12.0-17.7)	**16.6** (13.4-20.9)	**18.8** (14.8-24.4)	**22.0** (16.6-29.7)	**24.5** (18.0-34.2)
30-day	**4.84** (4.29-5.58)	**6.80** (6.01-7.85)	**9.44** (8.32-10.9)	**11.7** (10.2-13.6)	**14.8** (12.5-17.8)	**17.3** (14.3-21.2)	**19.9** (16.1-25.1)	**22.7** (17.9-29.4)	**26.7** (20.2-36.0)	**29.9** (21.9-41.7)
45-day	**5.78** (5.12-6.66)	**8.05** (7.12-9.29)	**11.1** (9.82-12.9)	**13.8** (12.0-16.0)	**17.5** (14.8-21.0)	**20.5** (17.0-25.2)	**23.6** (19.1-29.8)	**27.1** (21.3-35.0)	**32.0** (24.2-43.1)	**36.0** (26.3-50.2)
60-day	**6.77** (5.99-7.80)	**9.32** (8.24-10.8)	**12.8** (11.3-14.8)	**15.8** (13.8-18.4)	**20.0** (17.0-24.2)	**23.5** (19.5-28.9)	**27.2** (22.0-34.2)	**31.2** (24.6-40.4)	**37.0** (28.0-49.9)	**41.8** (30.6-58.3)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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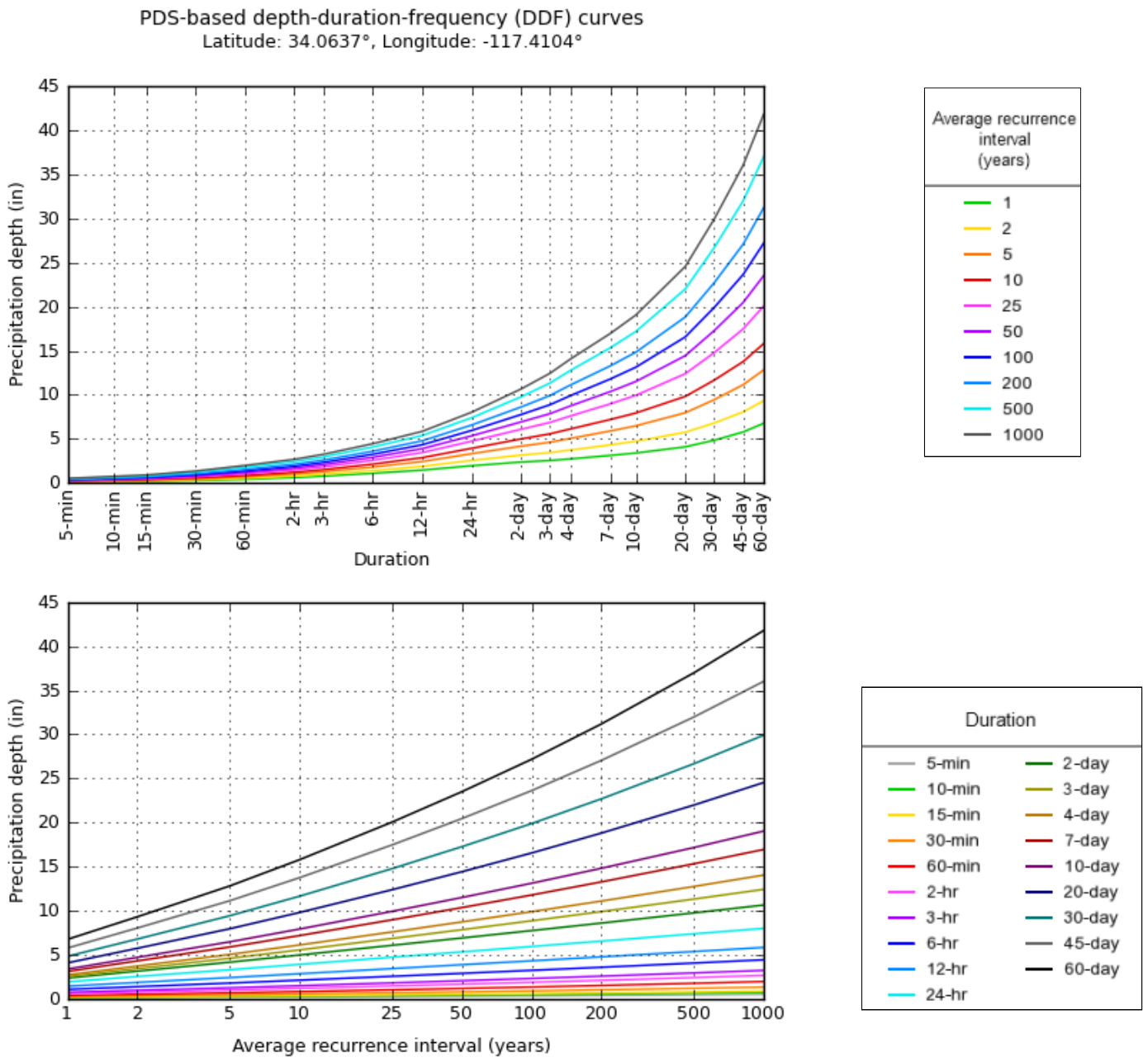
PF graphical



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Wed Aug 31 00:27:16 2022

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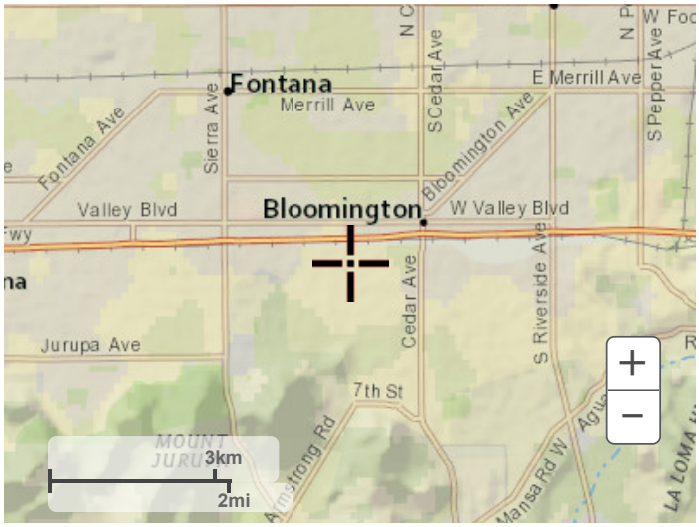
Maps & aerials

Small scale terrain



Large scale terrain

Large scale map

Large scale aerial

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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDICES

APPENDIX A: EXISTING RATIONAL METHOD, 2, 25 & 100 YEAR STORM FREQUENCY OUTPUT FILES.

```
 ************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2008 Advanced Engineering Software (aes)
             Ver. 15.0  Release Date: 04/01/2008  License ID 1420

                           Analysis prepared by:

                                CA Engineering
                           13821 Newport Ave., Ste 110
                                Tustin, Ca. 92780


  ************************** DESCRIPTION OF STUDY *************************
 * EXISTING CONDITION                                                    *
 * 2 YR STORM                                                            *
 *                                                                       *
  ************************************************************************

   FILE NAME: 251-76EX.DAT
   TIME/DATE OF STUDY: 18:15 09/14/2022
 ========================================================================
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ========================================================================
                       --*TIME-OF-CONCENTRATION MODEL*--

   USER SPECIFIED STORM EVENT(YEAR) =    2.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
   *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

   SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
   USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3700

   *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

   *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.*
   *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

 ************************************************************************
   FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   347.00
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   1082.50  DOWNSTREAM(FEET) =   1077.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   22.568
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.463
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "GRASS"                     A        2.13      1.19     1.000    21   22.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.19
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.44
  TOTAL AREA(ACRES) =      2.13   PEAK FLOW RATE(CFS) =      2.44
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.1  TC(MIN.) =     22.57
  EFFECTIVE AREA(ACRES) =      2.13  AREA-AVERAGED Fm(INCH/HR)=  1.19
  AREA-AVERAGED Fp(INCH/HR) =  1.19  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       2.44
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2008 Advanced Engineering Software (aes)
            Ver. 15.0  Release Date: 04/01/2008  License ID 1420

                          Analysis prepared by:

                              CA Engineering
                          13821 Newport Ave., Ste 110
                               Tustin, Ca. 92780


 ************************* DESCRIPTION OF STUDY *************************
* EXISTING CONDITION                                                    *
* 25 YR STORM                                                           *
*                                                                       *
 ************************************************************************

  FILE NAME: 251-76EX.DAT
  TIME/DATE OF STUDY: 18:14 09/14/2022
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3700

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   347.00
  ELEVATION DATA: UPSTREAM(FEET) =   1082.50  DOWNSTREAM(FEET) =   1077.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   22.568
```

```
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.463
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "GRASS"                     A        2.13      0.94     1.000    38   22.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.93
  TOTAL AREA(ACRES) =      2.13   PEAK FLOW RATE(CFS) =      2.93
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.1  TC(MIN.) =     22.57
  EFFECTIVE AREA(ACRES) =      2.13  AREA-AVERAGED Fm(INCH/HR)=  0.94
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       2.93
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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            Ver. 15.0  Release Date: 04/01/2008  License ID 1420

                        Analysis prepared by:

                            CA Engineering
                       13821 Newport Ave., Ste 110
                            Tustin, Ca. 92780


 ************************ DESCRIPTION OF STUDY ************************
* EXISTING CONDITION                                                  *
* 100 YR STORM                                                        *
*                                                                     *
 **********************************************************************

  FILE NAME: 251-76EX.DAT
  TIME/DATE OF STUDY: 18:13 09/14/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3700

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   347.00
  ELEVATION DATA: UPSTREAM(FEET) =   1082.50  DOWNSTREAM(FEET) =   1077.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   22.568
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.463
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "GRASS"                     A        2.13      0.66     1.000    58   22.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.66
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.46
  TOTAL AREA(ACRES) =      2.13   PEAK FLOW RATE(CFS) =      3.46
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.1  TC(MIN.) =     22.57
  EFFECTIVE AREA(ACRES) =      2.13  AREA-AVERAGED Fm(INCH/HR)=  0.66
  AREA-AVERAGED Fp(INCH/HR) =  0.66  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       3.46
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX B: PROPOSED RATIONAL METHOD, 2, 25 & 100 YEAR STORM FREQUENCY OUTPUT FILES.

```
 ************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                          Analysis prepared by:

                               CA Engineering
                          13821 Newport Ave., Ste 110
                               Tustin, Ca. 92780


 ************************* DESCRIPTION OF STUDY *************************
* PROPOSED CONDITION                                                    *
* 2 YR STORM                                                            *
*                                                                       *
 ************************************************************************

  FILE NAME: 251-76PR.DAT
  TIME/DATE OF STUDY: 11:47 08/31/2022
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.5430

  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   150.00
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   1081.00  DOWNSTREAM(FEET) =   1077.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.412
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 A        0.49      1.33     0.100    17    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.00
 TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      1.00

****************************************************************************
 FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1074.80  DOWNSTREAM(FEET) =  1074.15
 FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.78
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.00
 PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =    5.78
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     280.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.78
 RAINFALL INTENSITY(INCH/HR) =   2.21
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  1.33
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.49
 TOTAL STREAM AREA(ACRES) =       0.49
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.00

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   162.00
 ELEVATION DATA: UPSTREAM(FEET) =   1081.50  DOWNSTREAM(FEET) =   1077.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.412
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 A        0.36      1.33     0.100    17    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA RUNOFF(CFS) =      0.74
  TOTAL AREA(ACRES) =      0.36   PEAK FLOW RATE(CFS) =      0.74

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1074.80  DOWNSTREAM(FEET) =  1074.15
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.15
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.74
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =    5.43
  LONGEST FLOWPATH FROM NODE      4.00 TO NODE      3.00 =     244.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.43
  RAINFALL INTENSITY(INCH/HR) =   2.29
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.36
  TOTAL STREAM AREA(ACRES) =       0.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.74

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.00    5.78    2.211  1.33( 0.13) 0.10       0.5       1.00
      2        0.74    5.43    2.294  1.33( 0.13) 0.10       0.4       4.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.72    5.43    2.294  1.33( 0.13) 0.10       0.8       4.00
      2        1.71    5.78    2.211  1.33( 0.13) 0.10       0.9       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.72    Tc(MIN.) =     5.43
  EFFECTIVE AREA(ACRES) =       0.82   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  1074.15  DOWNSTREAM(FEET) =  1073.50
  FLOW LENGTH(FEET) =   126.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.28
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.72
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =    6.07
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     406.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.07
  RAINFALL INTENSITY(INCH/HR) =   2.15
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.82
  TOTAL STREAM AREA(ACRES) =       0.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.72

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   177.00
  ELEVATION DATA: UPSTREAM(FEET) =   1083.70  DOWNSTREAM(FEET) =   1080.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.224
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.349
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.39      1.33     0.100    17    5.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.39   PEAK FLOW RATE(CFS) =      0.78

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1075.00  DOWNSTREAM(FEET) =  1073.50
  FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.23
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.78
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.24
  LONGEST FLOWPATH FROM NODE      7.00 TO NODE      6.00 =     188.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.24
  RAINFALL INTENSITY(INCH/HR) =   2.34
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.39
  TOTAL STREAM AREA(ACRES) =       0.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.78

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.72    6.07    2.146  1.33( 0.13) 0.10       0.8       4.00
      1        1.71    6.42    2.076  1.33( 0.13) 0.10       0.9       1.00
      2        0.78    5.24    2.344  1.33( 0.13) 0.10       0.4       7.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.41    5.24    2.344  1.33( 0.13) 0.10       1.1       7.00
      2        2.43    6.07    2.146  1.33( 0.13) 0.10       1.2       4.00
      3        2.40    6.42    2.076  1.33( 0.13) 0.10       1.2       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.43    Tc(MIN.) =     6.07
  EFFECTIVE AREA(ACRES) =       1.21   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.2
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     406.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      9.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.50  DOWNSTREAM(FEET) =  1073.35
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.55
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.43
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    6.21
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =     436.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.21
  RAINFALL INTENSITY(INCH/HR) =   2.12
```

```
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.21
  TOTAL STREAM AREA(ACRES) =       1.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.43

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   145.00
  ELEVATION DATA: UPSTREAM(FEET) =   1081.50  DOWNSTREAM(FEET) =   1080.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.552
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.265
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.20      1.33     0.100    17    5.55
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      0.38

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE      9.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1075.00  DOWNSTREAM(FEET) =  1073.35
  FLOW LENGTH(FEET) =    10.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.21
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.38
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.57
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE      9.00 =     155.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.57
  RAINFALL INTENSITY(INCH/HR) =   2.26
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.20
  TOTAL STREAM AREA(ACRES) =       0.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.38

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
     1        2.41    5.38    2.307  1.33( 0.13) 0.10       1.1       7.00
     1        2.43    6.21    2.117  1.33( 0.13) 0.10       1.2       4.00
     1        2.40    6.56    2.049  1.33( 0.13) 0.10       1.2       1.00
     2        0.38    5.57    2.260  1.33( 0.13) 0.10       0.2      10.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        2.79    5.38    2.307  1.33( 0.13) 0.10       1.3       7.00
     2        2.80    5.57    2.260  1.33( 0.13) 0.10       1.3      10.00
     3        2.79    6.21    2.117  1.33( 0.13) 0.10       1.4       4.00
     4        2.74    6.56    2.049  1.33( 0.13) 0.10       1.4       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.80    Tc(MIN.) =     5.57
  EFFECTIVE AREA(ACRES) =       1.32   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.4
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =     436.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.35  DOWNSTREAM(FEET) =  1072.00
  FLOW LENGTH(FEET) =   266.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.69
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.80
  PIPE TRAVEL TIME(MIN.) =   1.20    Tc(MIN.) =    6.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =     702.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.77
  RAINFALL INTENSITY(INCH/HR) =   2.01
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.32
  TOTAL STREAM AREA(ACRES) =       1.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.80

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     12.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   296.00
  ELEVATION DATA: UPSTREAM(FEET) =   1084.40  DOWNSTREAM(FEET) =   1080.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.870
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.993
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.69      1.33     0.100    17    6.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.16
  TOTAL AREA(ACRES) =      0.69   PEAK FLOW RATE(CFS) =      1.16

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.87
  RAINFALL INTENSITY(INCH/HR) =   1.99
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.69
  TOTAL STREAM AREA(ACRES) =       0.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.16

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.79    6.59    2.044  1.33( 0.13) 0.10       1.3       7.00
      1        2.80    6.77    2.010  1.33( 0.13) 0.10       1.3      10.00
      1        2.79    7.42    1.904  1.33( 0.13) 0.10       1.4       4.00
      1        2.74    7.77    1.851  1.33( 0.13) 0.10       1.4       1.00
      2        1.16    6.87    1.993  1.33( 0.13) 0.10       0.7      13.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.93    6.59    2.044  1.33( 0.13) 0.10       2.0       7.00
      2        3.95    6.77    2.010  1.33( 0.13) 0.10       2.0      10.00
      3        3.95    6.87    1.993  1.33( 0.13) 0.10       2.0      13.00
      4        3.89    7.42    1.904  1.33( 0.13) 0.10       2.1       4.00
      5        3.81    7.77    1.851  1.33( 0.13) 0.10       2.1       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.95    Tc(MIN.) =     6.87
  EFFECTIVE AREA(ACRES) =       2.03   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =     702.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.1  TC(MIN.) =      6.87
  EFFECTIVE AREA(ACRES) =      2.03  AREA-AVERAGED Fm(INCH/HR)=  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       3.95
```

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	3.93	6.59	2.044	1.33(0.13)	0.10	2.0	7.00
2	3.95	6.77	2.010	1.33(0.13)	0.10	2.0	10.00
3	3.95	6.87	1.993	1.33(0.13)	0.10	2.0	13.00
4	3.89	7.42	1.904	1.33(0.13)	0.10	2.1	4.00
5	3.81	7.77	1.851	1.33(0.13)	0.10	2.1	1.00

END OF RATIONAL METHOD ANALYSIS

```
 ************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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                          Analysis prepared by:

                              CA Engineering
                         13821 Newport Ave., Ste 110
                              Tustin, Ca. 92780


 ************************* DESCRIPTION OF STUDY *************************
* PROPOSED CONDITION                                                    *
* 25 YR STORM                                                           *
*                                                                       *
 ************************************************************************

  FILE NAME: 251-76PR.DAT
  TIME/DATE OF STUDY: 11:46 08/31/2022
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.0500

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   150.00
  ELEVATION DATA: UPSTREAM(FEET) =   1081.00  DOWNSTREAM(FEET) =   1077.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
```

```
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.663
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.49      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.01
  TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      2.01

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1074.80  DOWNSTREAM(FEET) =  1074.15
  FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.33
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.01
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =    5.65
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.65
  RAINFALL INTENSITY(INCH/HR) =   4.33
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.49
  TOTAL STREAM AREA(ACRES) =       0.49
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.01

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   162.00
  ELEVATION DATA: UPSTREAM(FEET) =   1081.50  DOWNSTREAM(FEET) =   1077.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.663
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.36      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.48
  TOTAL AREA(ACRES) =      0.36   PEAK FLOW RATE(CFS) =      1.48

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

```
  FLOW PROCESS FROM NODE      5.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1074.80  DOWNSTREAM(FEET) =  1074.15
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.73
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.48
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =    5.37
  LONGEST FLOWPATH FROM NODE      4.00 TO NODE      3.00 =     244.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.37
  RAINFALL INTENSITY(INCH/HR) =   4.47
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.36
  TOTAL STREAM AREA(ACRES) =       0.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.48

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.01    5.65    4.333  0.98( 0.10) 0.10       0.5       1.00
      2        1.48    5.37    4.470  0.97( 0.10) 0.10       0.4       4.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.45    5.37    4.470  0.98( 0.10) 0.10       0.8       4.00
      2        3.45    5.65    4.333  0.98( 0.10) 0.10       0.9       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.45    Tc(MIN.) =     5.37
  EFFECTIVE AREA(ACRES) =       0.83   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1074.15  DOWNSTREAM(FEET) =  1073.50
  FLOW LENGTH(FEET) =   126.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.88
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.45
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =    5.91
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     406.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.91
  RAINFALL INTENSITY(INCH/HR) =   4.22
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.83
  TOTAL STREAM AREA(ACRES) =       0.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.45

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   177.00
  ELEVATION DATA: UPSTREAM(FEET) =   1083.70  DOWNSTREAM(FEET) =   1080.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.224
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.542
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.39      0.98     0.100    32    5.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.56
  TOTAL AREA(ACRES) =      0.39   PEAK FLOW RATE(CFS) =      1.56

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1075.00  DOWNSTREAM(FEET) =  1073.50
  FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.84
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.56
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.24
  LONGEST FLOWPATH FROM NODE      7.00 TO NODE      6.00 =     188.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.24
  RAINFALL INTENSITY(INCH/HR) =   4.53
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.39
  TOTAL STREAM AREA(ACRES) =       0.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.56

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.45    5.91    4.219  0.98( 0.10) 0.10       0.8       4.00
      1        3.45    6.19    4.102  0.98( 0.10) 0.10       0.9       1.00
      2        1.56    5.24    4.533  0.97( 0.10) 0.10       0.4       7.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.86    5.24    4.533  0.98( 0.10) 0.10       1.1       7.00
      2        4.90    5.91    4.219  0.98( 0.10) 0.10       1.2       4.00
      3        4.85    6.19    4.102  0.98( 0.10) 0.10       1.2       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.90    Tc(MIN.) =     5.91
  EFFECTIVE AREA(ACRES) =       1.22   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.2
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     406.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      9.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.50  DOWNSTREAM(FEET) =  1073.35
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.21
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.90
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    6.03
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =     436.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.03
  RAINFALL INTENSITY(INCH/HR) =   4.17
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.22
```

```
  TOTAL STREAM AREA(ACRES) =       1.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.90

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   145.00
  ELEVATION DATA: UPSTREAM(FEET) =   1081.50  DOWNSTREAM(FEET) =   1080.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.552
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.379
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.20      0.98     0.100    32    5.55
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.77
  TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      0.77

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE      9.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1075.00  DOWNSTREAM(FEET) =  1073.35
  FLOW LENGTH(FEET) =    10.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.91
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.77
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.57
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE      9.00 =     155.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.57
  RAINFALL INTENSITY(INCH/HR) =   4.37
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.20
  TOTAL STREAM AREA(ACRES) =       0.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.77

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.86    5.36    4.473  0.98( 0.10) 0.10       1.1       7.00
      1        4.90    6.03    4.169  0.98( 0.10) 0.10       1.2       4.00
      1        4.85    6.31    4.055  0.98( 0.10) 0.10       1.2       1.00
      2        0.77    5.57    4.371  0.97( 0.10) 0.10       0.2      10.00
```

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.62    5.36    4.473  0.98( 0.10) 0.10       1.3       7.00
      2        5.64    5.57    4.371  0.98( 0.10) 0.10       1.4      10.00
      3        5.64    6.03    4.169  0.98( 0.10) 0.10       1.4       4.00
      4        5.57    6.31    4.055  0.98( 0.10) 0.10       1.4       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.64    Tc(MIN.) =     5.57
  EFFECTIVE AREA(ACRES) =       1.35   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.4
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =     436.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.35  DOWNSTREAM(FEET) =  1072.00
  FLOW LENGTH(FEET) =   266.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.36
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.64
  PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =    6.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =     702.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.59
  RAINFALL INTENSITY(INCH/HR) =   3.95
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.35
  TOTAL STREAM AREA(ACRES) =       1.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.64

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     12.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   296.00
  ELEVATION DATA: UPSTREAM(FEET) =   1084.40  DOWNSTREAM(FEET) =   1080.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.870
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.854
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  A        0.69      0.98     0.100    32    6.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.33
  TOTAL AREA(ACRES) =      0.69   PEAK FLOW RATE(CFS) =      2.33

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.87
  RAINFALL INTENSITY(INCH/HR) =   3.85
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.69
  TOTAL STREAM AREA(ACRES) =       0.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.33

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.62    6.38    4.029  0.98( 0.10) 0.10       1.3       7.00
      1        5.64    6.59    3.953  0.98( 0.10) 0.10       1.4      10.00
      1        5.64    7.05    3.796  0.98( 0.10) 0.10       1.4       4.00
      1        5.57    7.33    3.706  0.98( 0.10) 0.10       1.4       1.00
      2        2.33    6.87    3.854  0.98( 0.10) 0.10       0.7      13.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.88    6.38    4.029  0.98( 0.10) 0.10       2.0       7.00
      2        7.94    6.59    3.953  0.98( 0.10) 0.10       2.0      10.00
      3        7.97    6.87    3.854  0.98( 0.10) 0.10       2.1      13.00
      4        7.93    7.05    3.796  0.98( 0.10) 0.10       2.1       4.00
      5        7.81    7.33    3.706  0.98( 0.10) 0.10       2.1       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.97    Tc(MIN.) =     6.87
  EFFECTIVE AREA(ACRES) =       2.08   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =     702.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.1  TC(MIN.) =      6.87
  EFFECTIVE AREA(ACRES) =      2.08  AREA-AVERAGED Fm(INCH/HR)=  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       7.97

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.88    6.38    4.029  0.98( 0.10) 0.10       2.0       7.00
```

```
      2        7.94    6.59    3.953  0.98( 0.10) 0.10       2.0      10.00
      3        7.97    6.87    3.854  0.98( 0.10) 0.10       2.1      13.00
      4        7.93    7.05    3.796  0.98( 0.10) 0.10       2.1       4.00
      5        7.81    7.33    3.706  0.98( 0.10) 0.10       2.1       1.00
 ================================================================================
 ================================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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                          Analysis prepared by:

                              CA Engineering
                          13821 Newport Ave., Ste 110
                               Tustin, Ca. 92780


 ************************* DESCRIPTION OF STUDY *************************
* PROPOSED CONDITION                                                    *
* 100 YR STORM                                                          *
*                                                                       *
 ************************************************************************

  FILE NAME: 251-76PR.DAT
  TIME/DATE OF STUDY: 11:44 08/31/2022
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3700

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *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.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   150.00
  ELEVATION DATA: UPSTREAM(FEET) =   1081.00  DOWNSTREAM(FEET) =   1077.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.085
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.49      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.65
  TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      2.65

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1074.80  DOWNSTREAM(FEET) =  1074.15
  FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.62
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.65
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =    5.60
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.60
  RAINFALL INTENSITY(INCH/HR) =   5.69
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.49
  TOTAL STREAM AREA(ACRES) =       0.49
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.65

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   162.00
  ELEVATION DATA: UPSTREAM(FEET) =   1081.50  DOWNSTREAM(FEET) =   1077.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.085
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.36      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.95
  TOTAL AREA(ACRES) =      0.36   PEAK FLOW RATE(CFS) =      1.95

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

```
  FLOW PROCESS FROM NODE      5.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1074.80  DOWNSTREAM(FEET) =  1074.15
  FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.99
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.95
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    5.34
  LONGEST FLOWPATH FROM NODE      4.00 TO NODE      3.00 =     244.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.34
  RAINFALL INTENSITY(INCH/HR) =   5.85
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.36
  TOTAL STREAM AREA(ACRES) =       0.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.95

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.65    5.60    5.686  0.74( 0.07) 0.10       0.5       1.00
      2        1.95    5.34    5.847  0.74( 0.07) 0.10       0.4       4.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.55    5.34    5.847  0.74( 0.07) 0.10       0.8       4.00
      2        4.54    5.60    5.686  0.74( 0.07) 0.10       0.9       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.55    Tc(MIN.) =     5.34
  EFFECTIVE AREA(ACRES) =       0.83   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1074.15  DOWNSTREAM(FEET) =  1073.50
  FLOW LENGTH(FEET) =   126.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.20
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.55
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    5.84
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     406.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.84
  RAINFALL INTENSITY(INCH/HR) =   5.54
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.83
  TOTAL STREAM AREA(ACRES) =       0.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.55

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   177.00
  ELEVATION DATA: UPSTREAM(FEET) =   1083.70  DOWNSTREAM(FEET) =   1080.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.224
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.927
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.39      0.74     0.100    52    5.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.05
  TOTAL AREA(ACRES) =      0.39   PEAK FLOW RATE(CFS) =      2.05

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1075.00  DOWNSTREAM(FEET) =  1073.50
  FLOW LENGTH(FEET) =    11.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.73
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.05
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.24
  LONGEST FLOWPATH FROM NODE      7.00 TO NODE      6.00 =     188.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.24
  RAINFALL INTENSITY(INCH/HR) =   5.92
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.39
  TOTAL STREAM AREA(ACRES) =       0.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.05

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.55    5.84    5.541  0.74( 0.07) 0.10       0.8       4.00
      1        4.54    6.10    5.401  0.74( 0.07) 0.10       0.9       1.00
      2        2.05    5.24    5.916  0.74( 0.07) 0.10       0.4       7.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.41    5.24    5.916  0.74( 0.07) 0.10       1.1       7.00
      2        6.47    5.84    5.541  0.74( 0.07) 0.10       1.2       4.00
      3        6.42    6.10    5.401  0.74( 0.07) 0.10       1.2       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.47    Tc(MIN.) =     5.84
  EFFECTIVE AREA(ACRES) =       1.22   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.2
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     406.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      9.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.50  DOWNSTREAM(FEET) =  1073.35
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.47
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    5.96
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =     436.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.96
  RAINFALL INTENSITY(INCH/HR) =   5.48
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.22
```

```
  TOTAL STREAM AREA(ACRES) =       1.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.47

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   145.00
  ELEVATION DATA: UPSTREAM(FEET) =   1081.50  DOWNSTREAM(FEET) =   1080.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.552
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.714
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.20      0.74     0.100    52    5.55
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.02
  TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      1.02

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE      9.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1075.00  DOWNSTREAM(FEET) =  1073.35
  FLOW LENGTH(FEET) =    10.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.59
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.02
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.57
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE      9.00 =     155.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.57
  RAINFALL INTENSITY(INCH/HR) =   5.70
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.20
  TOTAL STREAM AREA(ACRES) =       0.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.02

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.41    5.35    5.840  0.74( 0.07) 0.10       1.1       7.00
      1        6.47    5.96    5.478  0.74( 0.07) 0.10       1.2       4.00
      1        6.42    6.21    5.342  0.74( 0.07) 0.10       1.2       1.00
      2        1.02    5.57    5.704  0.74( 0.07) 0.10       0.2      10.00
```

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.41    5.35    5.840  0.74( 0.07) 0.10       1.3       7.00
      2        7.45    5.57    5.704  0.74( 0.07) 0.10       1.4      10.00
      3        7.45    5.96    5.478  0.74( 0.07) 0.10       1.4       4.00
      4        7.37    6.21    5.342  0.74( 0.07) 0.10       1.4       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.45    Tc(MIN.) =     5.57
  EFFECTIVE AREA(ACRES) =       1.36   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.4
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =     436.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.35  DOWNSTREAM(FEET) =  1072.00
  FLOW LENGTH(FEET) =   266.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.70
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.45
  PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =    6.51
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =     702.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.51
  RAINFALL INTENSITY(INCH/HR) =   5.19
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.36
  TOTAL STREAM AREA(ACRES) =       1.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.45

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     12.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   296.00
  ELEVATION DATA: UPSTREAM(FEET) =   1084.40  DOWNSTREAM(FEET) =   1080.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.870
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.028
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  A        0.69      0.74     0.100    52    6.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      3.08
  TOTAL AREA(ACRES) =      0.69   PEAK FLOW RATE(CFS) =      3.08

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.87
  RAINFALL INTENSITY(INCH/HR) =   5.03
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.69
  TOTAL STREAM AREA(ACRES) =       0.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.08

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.41    6.30    5.298  0.74( 0.07) 0.10       1.3       7.00
      1        7.45    6.51    5.193  0.74( 0.07) 0.10       1.4      10.00
      1        7.45    6.90    5.016  0.74( 0.07) 0.10       1.4       4.00
      1        7.37    7.16    4.907  0.74( 0.07) 0.10       1.4       1.00
      2        3.08    6.87    5.028  0.74( 0.07) 0.10       0.7      13.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       10.39    6.30    5.298  0.74( 0.07) 0.10       2.0       7.00
      2       10.46    6.51    5.193  0.74( 0.07) 0.10       2.0      10.00
      3       10.52    6.87    5.028  0.74( 0.07) 0.10       2.1      13.00
      4       10.52    6.90    5.016  0.74( 0.07) 0.10       2.1       4.00
      5       10.37    7.16    4.907  0.74( 0.07) 0.10       2.1       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.52    Tc(MIN.) =     6.87
  EFFECTIVE AREA(ACRES) =       2.10   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =     702.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.1  TC(MIN.) =      6.87
  EFFECTIVE AREA(ACRES) =      2.10  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =      10.52

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       10.39    6.30    5.298  0.74( 0.07) 0.10       2.0       7.00
```

```
      2       10.46    6.51    5.193  0.74( 0.07) 0.10       2.0      10.00
      3       10.52    6.87    5.028  0.74( 0.07) 0.10       2.1      13.00
      4       10.52    6.90    5.016  0.74( 0.07) 0.10       2.1       4.00
      5       10.37    7.16    4.907  0.74( 0.07) 0.10       2.1       1.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX C: 100 YEAR STORM EXISTING & PROPOSED HYDROGRAPHS

```
**************************************************************************
                    SMALL AREA UNIT HYDROGRAPH MODEL
==========================================================================
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                          Analysis prepared by:

                               CA Engineering
                          13821 Newport Ave., Ste 110
                               Tustin, Ca. 92780


**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:

  Existing 100 Year Hydrograph

--------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    2.13
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.660
    LOW LOSS FRACTION = 0.280
    TIME OF CONCENTRATION(MIN.) = 22.57
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.36
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.93
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.37
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.33
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.26
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.96

--------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.68
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.38

**************************************************************************
  TIME     VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)    (AF)      (CFS)
--------------------------------------------------------------------------
  0.20      0.0000      0.00  Q         .         .         .         .
  0.58      0.0023      0.15  Q         .         .         .         .
  0.95      0.0071      0.15  Q         .         .         .         .
  1.33      0.0118      0.16  Q         .         .         .         .
  1.71      0.0167      0.16  Q         .         .         .         .
  2.08      0.0216      0.16  Q         .         .         .         .
  2.46      0.0266      0.16  Q         .         .         .         .
  2.83      0.0317      0.16  Q         .         .         .         .
  3.21      0.0368      0.17  Q         .         .         .         .
  3.59      0.0421      0.17  Q         .         .         .         .
  3.96      0.0474      0.17  Q         .         .         .         .
  4.34      0.0528      0.18  Q         .         .         .         .
```

```
 4.72      0.0583      0.18  Q         .         .         .         .
 5.09      0.0639      0.18  Q         .         .         .         .
 5.47      0.0696      0.19  Q         .         .         .         .
 5.84      0.0755      0.19  Q         .         .         .         .
 6.22      0.0814      0.19  Q         .         .         .         .
 6.60      0.0875      0.20  Q         .         .         .         .
 6.97      0.0937      0.20  Q         .         .         .         .
 7.35      0.1001      0.21  Q         .         .         .         .
 7.72      0.1066      0.21  Q         .         .         .         .
 8.10      0.1133      0.22  Q         .         .         .         .
 8.48      0.1201      0.22  Q         .         .         .         .
 8.85      0.1272      0.23  Q         .         .         .         .
 9.23      0.1344      0.24  Q         .         .         .         .
 9.61      0.1419      0.25  Q         .         .         .         .
 9.98      0.1496      0.25  .Q        .         .         .         .
10.36      0.1575      0.26  .Q        .         .         .         .
10.73      0.1658      0.27  .Q        .         .         .         .
11.11      0.1744      0.28  .Q        .         .         .         .
11.49      0.1833      0.29  .Q        .         .         .         .
11.86      0.1926      0.31  .Q        .         .         .         .
12.24      0.2024      0.32  .Q        .         .         .         .
12.61      0.2133      0.38  .Q        .         .         .         .
12.99      0.2254      0.40  .Q        .         .         .         .
13.37      0.2383      0.43  .Q        .         .         .         .
13.74      0.2520      0.45  .Q        .         .         .         .
14.12      0.2668      0.50  . Q       .         .         .         .
14.50      0.2829      0.54  . Q       .         .         .         .
14.87      0.3010      0.63  . Q       .         .         .         .
15.25      0.3216      0.70  . Q       .         .         .         .
15.62      0.3486      1.04  .   Q     .         .         .         .
16.00      0.3857      1.35  .    Q    .         .         .         .
16.38      0.4524      2.94  .         .Q        .         .         .
16.75      0.5105      0.80  .  Q      .         .         .         .
17.13      0.5318      0.58  . Q       .         .         .         .
17.50      0.5482      0.47  .Q        .         .         .         .
17.88      0.5620      0.41  .Q        .         .         .         .
18.26      0.5741      0.37  .Q        .         .         .         .
18.63      0.5845      0.30  .Q        .         .         .         .
19.01      0.5934      0.28  .Q        .         .         .         .
19.39      0.6017      0.26  .Q        .         .         .         .
19.76      0.6094      0.24  Q         .         .         .         .
20.14      0.6166      0.23  Q         .         .         .         .
20.51      0.6235      0.21  Q         .         .         .         .
20.89      0.6300      0.20  Q         .         .         .         .
21.27      0.6362      0.20  Q         .         .         .         .
21.64      0.6422      0.19  Q         .         .         .         .
22.02      0.6479      0.18  Q         .         .         .         .
22.39      0.6534      0.17  Q         .         .         .         .
22.77      0.6587      0.17  Q         .         .         .         .
23.15      0.6639      0.16  Q         .         .         .         .
23.52      0.6689      0.16  Q         .         .         .         .
23.90      0.6737      0.15  Q         .         .         .         .
24.28      0.6785      0.15  Q         .         .         .         .
24.65      0.6808      0.00  Q         .         .         .         .
-------------------------------------------------------------------------
```

```
**************************************************************************
                    SMALL AREA UNIT HYDROGRAPH MODEL
==========================================================================
         (C) Copyright 1989-2008 Advanced Engineering Software (aes)
             Ver. 15.0  Release Date: 04/01/2008  License ID 1420

                          Analysis prepared by:

                               CA Engineering
                          13821 Newport Ave., Ste 110
                               Tustin, Ca. 92780


**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:

  Proposed 100 Year Hydrograph

--------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    2.13
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.070
    LOW LOSS FRACTION = 0.020
    TIME OF CONCENTRATION(MIN.) =  6.87
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.36
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.93
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.37
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.33
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.26
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.96

--------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.93
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.13

**************************************************************************
  TIME     VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)    (AF)      (CFS)
--------------------------------------------------------------------------
  0.08      0.0007      0.20  Q         .         .         .         .
  0.20      0.0026      0.20  Q         .         .         .         .
  0.31      0.0046      0.20  Q         .         .         .         .
  0.43      0.0065      0.21  Q         .         .         .         .
  0.54      0.0085      0.21  Q         .         .         .         .
  0.66      0.0104      0.21  Q         .         .         .         .
  0.77      0.0124      0.21  Q         .         .         .         .
  0.89      0.0143      0.21  Q         .         .         .         .
  1.00      0.0163      0.21  Q         .         .         .         .
  1.12      0.0183      0.21  Q         .         .         .         .
  1.23      0.0203      0.21  Q         .         .         .         .
  1.34      0.0223      0.21  Q         .         .         .         .
  1.46      0.0243      0.21  Q         .         .         .         .
  1.57      0.0264      0.21  Q         .         .         .         .
  1.69      0.0284      0.22  Q         .         .         .         .
```

1.80	0.0304	0.22	Q	.	.	.	.
1.92	0.0325	0.22	Q	.	.	.	.
2.03	0.0346	0.22	Q	.	.	.	.
2.15	0.0366	0.22	Q	.	.	.	.
2.26	0.0387	0.22	Q	.	.	.	.
2.37	0.0408	0.22	Q	.	.	.	.
2.49	0.0429	0.22	Q	.	.	.	.
2.60	0.0450	0.22	Q	.	.	.	.
2.72	0.0471	0.22	Q	.	.	.	.
2.83	0.0493	0.23	Q	.	.	.	.
2.95	0.0514	0.23	Q	.	.	.	.
3.06	0.0536	0.23	Q	.	.	.	.
3.18	0.0557	0.23	Q	.	.	.	.
3.29	0.0579	0.23	Q	.	.	.	.
3.41	0.0601	0.23	Q	.	.	.	.
3.52	0.0623	0.23	Q	.	.	.	.
3.63	0.0645	0.23	Q	.	.	.	.
3.75	0.0667	0.24	Q	.	.	.	.
3.86	0.0689	0.24	Q	.	.	.	.
3.98	0.0712	0.24	Q	.	.	.	.
4.09	0.0734	0.24	Q	.	.	.	.
4.21	0.0757	0.24	Q	.	.	.	.
4.32	0.0780	0.24	Q	.	.	.	.
4.44	0.0803	0.24	Q	.	.	.	.
4.55	0.0826	0.24	Q	.	.	.	.
4.66	0.0849	0.25	Q	.	.	.	.
4.78	0.0872	0.25	Q	.	.	.	.
4.89	0.0896	0.25	Q	.	.	.	.
5.01	0.0919	0.25	Q	.	.	.	.
5.12	0.0943	0.25	.Q	.	.	.	.
5.24	0.0967	0.25	.Q	.	.	.	.
5.35	0.0991	0.25	.Q	.	.	.	.
5.47	0.1015	0.26	.Q	.	.	.	.
5.58	0.1039	0.26	.Q	.	.	.	.
5.70	0.1064	0.26	.Q	.	.	.	.
5.81	0.1088	0.26	.Q	.	.	.	.
5.92	0.1113	0.26	.Q	.	.	.	.
6.04	0.1138	0.26	.Q	.	.	.	.
6.15	0.1163	0.27	.Q	.	.	.	.
6.27	0.1188	0.27	.Q	.	.	.	.
6.38	0.1213	0.27	.Q	.	.	.	.
6.50	0.1239	0.27	.Q	.	.	.	.
6.61	0.1265	0.27	.Q	.	.	.	.
6.73	0.1291	0.28	.Q	.	.	.	.
6.84	0.1317	0.28	.Q	.	.	.	.
6.95	0.1343	0.28	.Q	.	.	.	.
7.07	0.1369	0.28	.Q	.	.	.	.
7.18	0.1396	0.28	.Q	.	.	.	.
7.30	0.1423	0.28	.Q	.	.	.	.
7.41	0.1450	0.29	.Q	.	.	.	.
7.53	0.1477	0.29	.Q	.	.	.	.
7.64	0.1505	0.29	.Q	.	.	.	.
7.76	0.1532	0.29	.Q	.	.	.	.
7.87	0.1560	0.30	.Q	.	.	.	.
7.99	0.1588	0.30	.Q	.	.	.	.
8.10	0.1617	0.30	.Q	.	.	.	.
8.21	0.1645	0.30	.Q	.	.	.	.
8.33	0.1674	0.31	.Q	.	.	.	.
8.44	0.1703	0.31	.Q	.	.	.	.
8.56	0.1732	0.31	.Q	.	.	.	.
8.67	0.1762	0.31	.Q	.	.	.	.
8.79	0.1791	0.32	.Q	.	.	.	.
8.90	0.1821	0.32	.Q	.	.	.	.

9.02	0.1852	0.32	.Q . . . .
9.13	0.1882	0.32	.Q . . . .
9.24	0.1913	0.33	.Q . . . .
9.36	0.1944	0.33	.Q . . . .
9.47	0.1976	0.33	.Q . . . .
9.59	0.2008	0.34	.Q . . . .
9.70	0.2040	0.34	.Q . . . .
9.82	0.2072	0.34	.Q . . . .
9.93	0.2105	0.35	.Q . . . .
10.05	0.2138	0.35	.Q . . . .
10.16	0.2172	0.36	.Q . . . .
10.27	0.2205	0.36	.Q . . . .
10.39	0.2240	0.36	.Q . . . .
10.50	0.2274	0.37	.Q . . . .
10.62	0.2309	0.37	.Q . . . .
10.73	0.2345	0.38	.Q . . . .
10.85	0.2380	0.38	.Q . . . .
10.96	0.2417	0.39	.Q . . . .
11.08	0.2453	0.39	.Q . . . .
11.19	0.2491	0.40	.Q . . . .
11.31	0.2528	0.40	.Q . . . .
11.42	0.2567	0.41	.Q . . . .
11.53	0.2605	0.41	.Q . . . .
11.65	0.2645	0.42	.Q . . . .
11.76	0.2685	0.43	.Q . . . .
11.88	0.2725	0.43	.Q . . . .
11.99	0.2766	0.44	.Q . . . .
12.11	0.2809	0.46	.Q . . . .
12.22	0.2855	0.50	. Q . . . .
12.34	0.2903	0.51	. Q . . . .
12.45	0.2951	0.52	. Q . . . .
12.57	0.3001	0.53	. Q . . . .
12.68	0.3051	0.54	. Q . . . .
12.79	0.3102	0.54	. Q . . . .
12.91	0.3155	0.56	. Q . . . .
13.02	0.3208	0.56	. Q . . . .
13.14	0.3262	0.58	. Q . . . .
13.25	0.3317	0.59	. Q . . . .
13.37	0.3374	0.60	. Q . . . .
13.48	0.3431	0.61	. Q . . . .
13.60	0.3490	0.63	. Q . . . .
13.71	0.3550	0.64	. Q . . . .
13.82	0.3612	0.67	. Q . . . .
13.94	0.3676	0.68	. Q . . . .
14.05	0.3741	0.70	. Q . . . .
14.17	0.3808	0.72	. Q . . . .
14.28	0.3877	0.75	. Q . . . .
14.40	0.3949	0.76	. Q . . . .
14.51	0.4023	0.80	. Q . . . .
14.63	0.4100	0.82	. Q . . . .
14.74	0.4180	0.87	. Q . . . .
14.85	0.4263	0.90	. Q . . . .
14.97	0.4351	0.96	. Q . . . .
15.08	0.4443	0.99	. Q . . . .
15.20	0.4541	1.08	. Q . . . .
15.31	0.4646	1.13	. Q . . . .
15.43	0.4765	1.40	. Q . . . .
15.54	0.4904	1.53	. Q . . . .
15.66	0.5059	1.75	. Q . . . .
15.77	0.5231	1.89	. Q . . . .
15.89	0.5435	2.43	. Q. . . .
16.00	0.5697	3.11	. . Q . . .
16.11	0.6177	7.02	. . . Q . .

16.23	0.6606	2.07	.	Q	.	.	.
16.34	0.6781	1.63	.	Q	.	.	.
16.46	0.6915	1.19	.	Q	.	.	.
16.57	0.7020	1.03	.	Q	.	.	.
16.69	0.7113	0.93	.	Q	.	.	.
16.80	0.7196	0.84	.	Q	.	.	.
16.92	0.7273	0.78	.	Q	.	.	.
17.03	0.7345	0.73	.	Q	.	.	.
17.14	0.7412	0.69	.	Q	.	.	.
17.26	0.7476	0.65	.	Q	.	.	.
17.37	0.7536	0.62	.	Q	.	.	.
17.49	0.7594	0.60	.	Q	.	.	.
17.60	0.7649	0.57	.	Q	.	.	.
17.72	0.7702	0.55	.	Q	.	.	.
17.83	0.7753	0.53	.	Q	.	.	.
17.95	0.7803	0.51	.	Q	.	.	.
18.06	0.7851	0.50	.	Q	.	.	.
18.18	0.7895	0.43	.	Q	.	.	.
18.29	0.7935	0.42	.	Q	.	.	.
18.40	0.7975	0.41	.	Q	.	.	.
18.52	0.8013	0.40	.	Q	.	.	.
18.63	0.8050	0.39	.	Q	.	.	.
18.75	0.8087	0.38	.	Q	.	.	.
18.86	0.8122	0.37	.	Q	.	.	.
18.98	0.8157	0.36	.	Q	.	.	.
19.09	0.8190	0.35	.	Q	.	.	.
19.21	0.8223	0.35	.	Q	.	.	.
19.32	0.8256	0.34	.	Q	.	.	.
19.43	0.8288	0.33	.	Q	.	.	.
19.55	0.8319	0.33	.	Q	.	.	.
19.66	0.8349	0.32	.	Q	.	.	.
19.78	0.8380	0.31	.	Q	.	.	.
19.89	0.8409	0.31	.	Q	.	.	.
20.01	0.8438	0.30	.	Q	.	.	.
20.12	0.8467	0.30	.	Q	.	.	.
20.24	0.8495	0.29	.	Q	.	.	.
20.35	0.8522	0.29	.	Q	.	.	.
20.47	0.8550	0.29	.	Q	.	.	.
20.58	0.8576	0.28	.	Q	.	.	.
20.69	0.8603	0.28	.	Q	.	.	.
20.81	0.8629	0.27	.	Q	.	.	.
20.92	0.8655	0.27	.	Q	.	.	.
21.04	0.8680	0.27	.	Q	.	.	.
21.15	0.8705	0.26	.	Q	.	.	.
21.27	0.8730	0.26	.	Q	.	.	.
21.38	0.8754	0.26	.	Q	.	.	.
21.50	0.8778	0.25	.	Q	.	.	.
21.61	0.8802	0.25	.	Q	.	.	.
21.73	0.8826	0.25	Q	.	.	.	.
21.84	0.8849	0.24	Q	.	.	.	.
21.95	0.8872	0.24	Q	.	.	.	.
22.07	0.8895	0.24	Q	.	.	.	.
22.18	0.8918	0.24	Q	.	.	.	.
22.30	0.8940	0.23	Q	.	.	.	.
22.41	0.8962	0.23	Q	.	.	.	.
22.53	0.8984	0.23	Q	.	.	.	.
22.64	0.9005	0.23	Q	.	.	.	.
22.76	0.9027	0.23	Q	.	.	.	.
22.87	0.9048	0.22	Q	.	.	.	.
22.98	0.9069	0.22	Q	.	.	.	.
23.10	0.9090	0.22	Q	.	.	.	.
23.21	0.9110	0.22	Q	.	.	.	.
23.33	0.9131	0.21	Q	.	.	.	.

```
 23.44      0.9151      0.21  Q         .         .         .         .
 23.56      0.9171      0.21  Q         .         .         .         .
 23.67      0.9191      0.21  Q         .         .         .         .
 23.79      0.9211      0.21  Q         .         .         .         .
 23.90      0.9230      0.21  Q         .         .         .         .
 24.02      0.9250      0.20  Q         .         .         .         .
 24.13      0.9259      0.00  Q         .         .         .         .
--------------------------------------------------------------------------
```

APPENDIX D: OUTFLOW PIPE CALCS

48" SD Outlet
Worksheet for Circular Channel

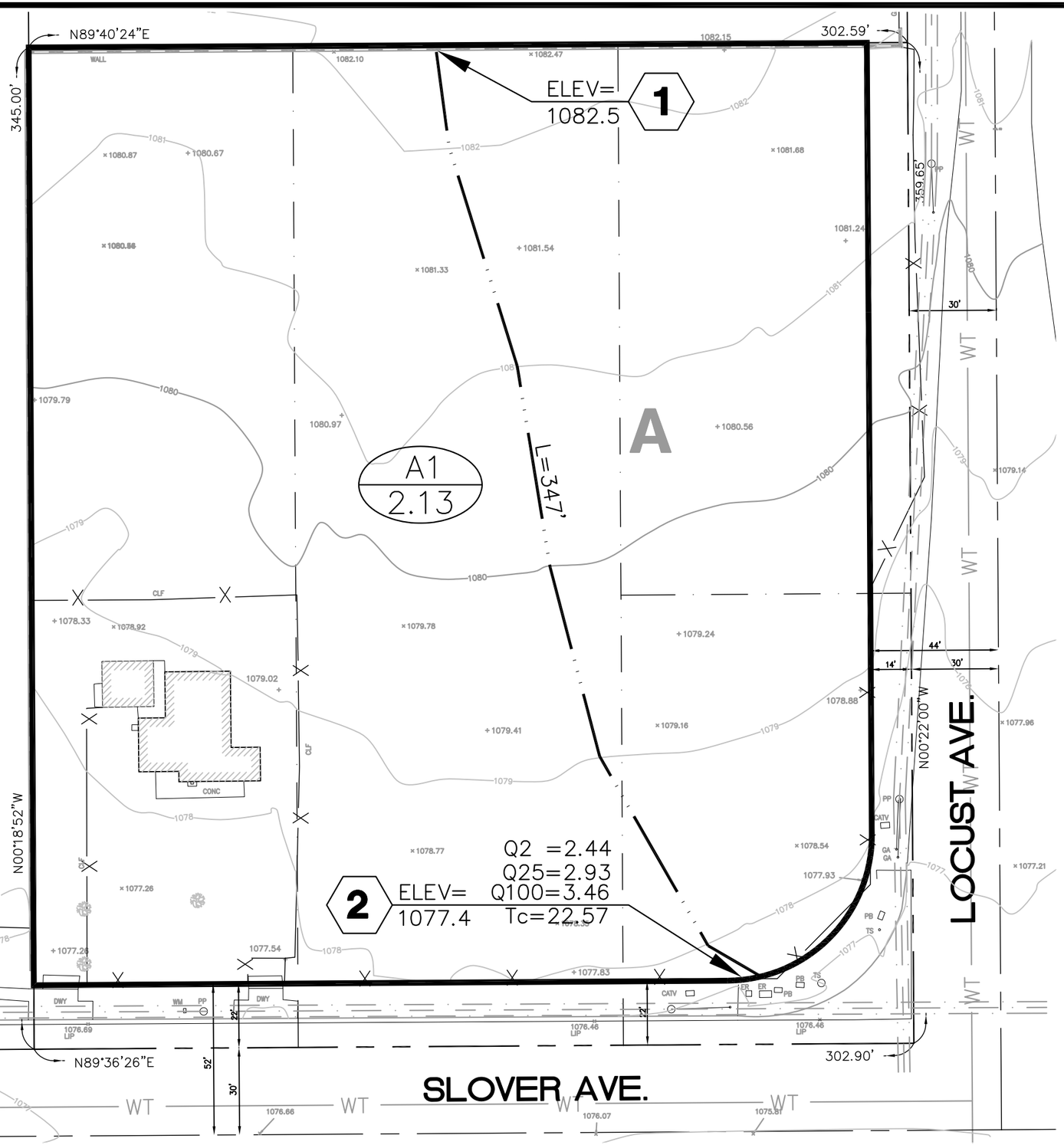
Project Description	
Project File	untitled.fm2
Worksheet	251-39 Signal Hill
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.020	ft/ft
Diameter	48.00	in
Discharge	10.52	cfs

Results		
Depth	0.62	ft
Flow Area	1.24	ft^2
Wetted Perimeter	3.23	ft
Top Width	2.89	ft
Critical Depth	0.95	ft
Percent Full	15.47	
Critical Slope	0.003573	ft/ft
Velocity	8.51	ft/s
Velocity Head	1.13	ft
Specific Energy	1.74	ft
Froude Number	2.30	
Maximum Discharge	218.51	cfs
Full Flow Capacity	203.13	cfs
Full Flow Slope	0.000054	ft/ft
Flow is supercritical.		

EXHIBITS

EXHIBIT A: EXISTING CONDITION HYDROLOGY MAP



LEGEND:

SUBAREA BOUNDARY

L=205' FLOWPATH

A2 / 1.83 — SUBAREA DESIGNATION / TRIBUTARY AREA (AC.)

DISCHARGE AT NODE (Q_2 cfs)/(Q_{10} cfs)/(Q_{100} cfs) — Q=13.41 EL= / Tc=11.37 527.8 — NODE NUMBER 4

TIME OF CONCENTRATION (Tc) FOR 100 YR STORM

F.S. ELEVATION AT NODE(ft)

SOIL TYPE — A

ENTIRE SITE

NORTH

CA

0 40

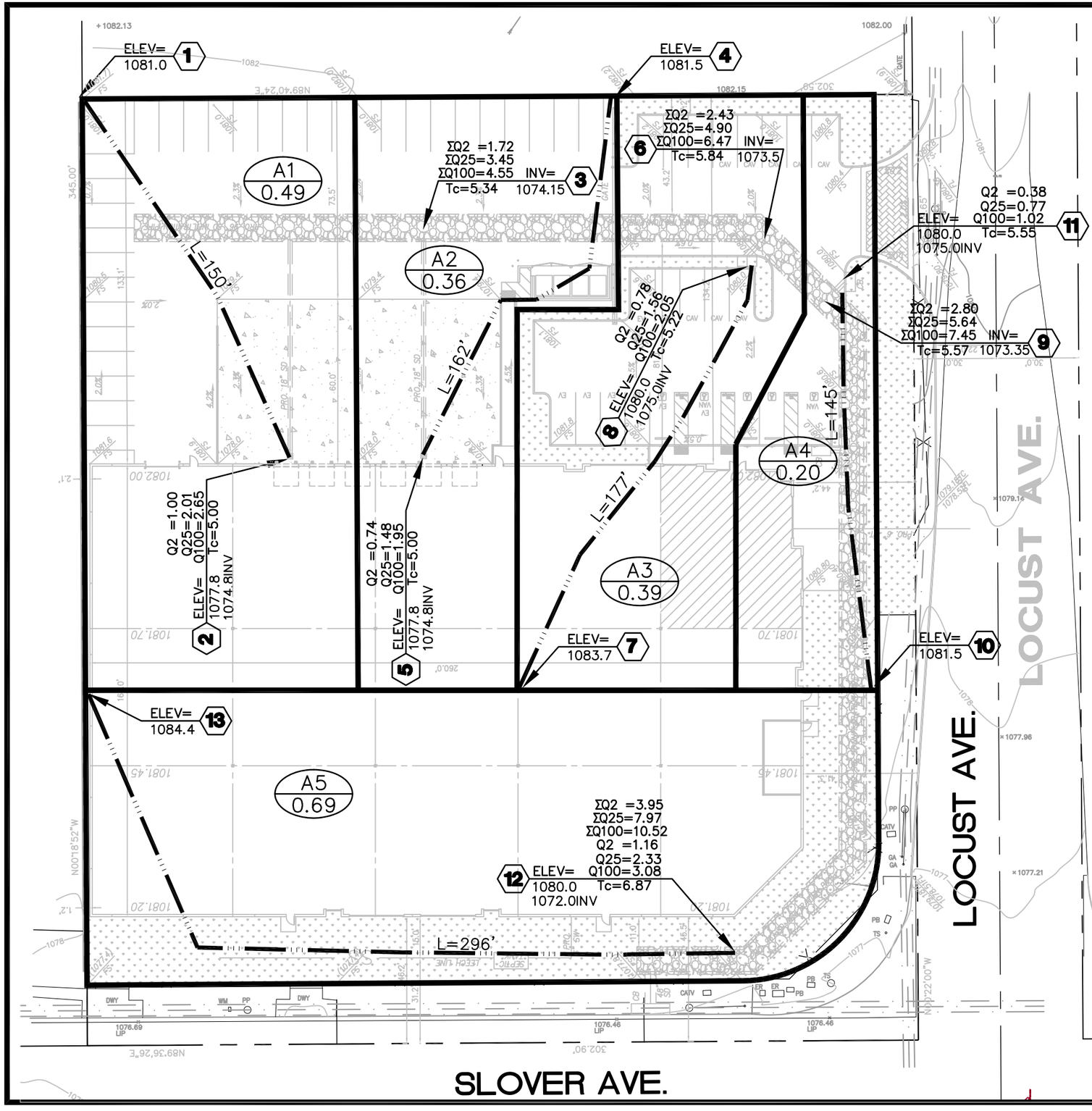
SCALE: 1"=40'

CITY OF BLOOMINGTON

HYDROLOGY MAP (EXISTING CONDITION)

10486 LOCUST AVENUE & 18060 SLOVER AVENUE BLOOMINGTON, CA

EXHIBIT B: PROPOSED CONDITION HYDROLOGY MAP



LEGEND:

SUBAREA BOUNDARY

L=205' FLOWPATH

SUBAREA DESIGNATION

TRIBUTARY AREA (AC.)

DISCHARGE AT NODE (Q_2 cfs)/(Q_{10} cfs)/(Q_{100} cfs)

NODE NUMBER

Q=13.41 EL= 4
Tc=11.37 527.8

TIME OF CONCENTRATION (Tc) FOR 100 YR STORM

F.S. ELEVATION AT NODE(ft)

SOIL TYPE → A

ENTIRE SITE

NORTH

CA

0 40

SCALE: 1"=40'

CITY OF BLOOMINGTON

HYDROLOGY MAP (PROPOSED CONDITION)

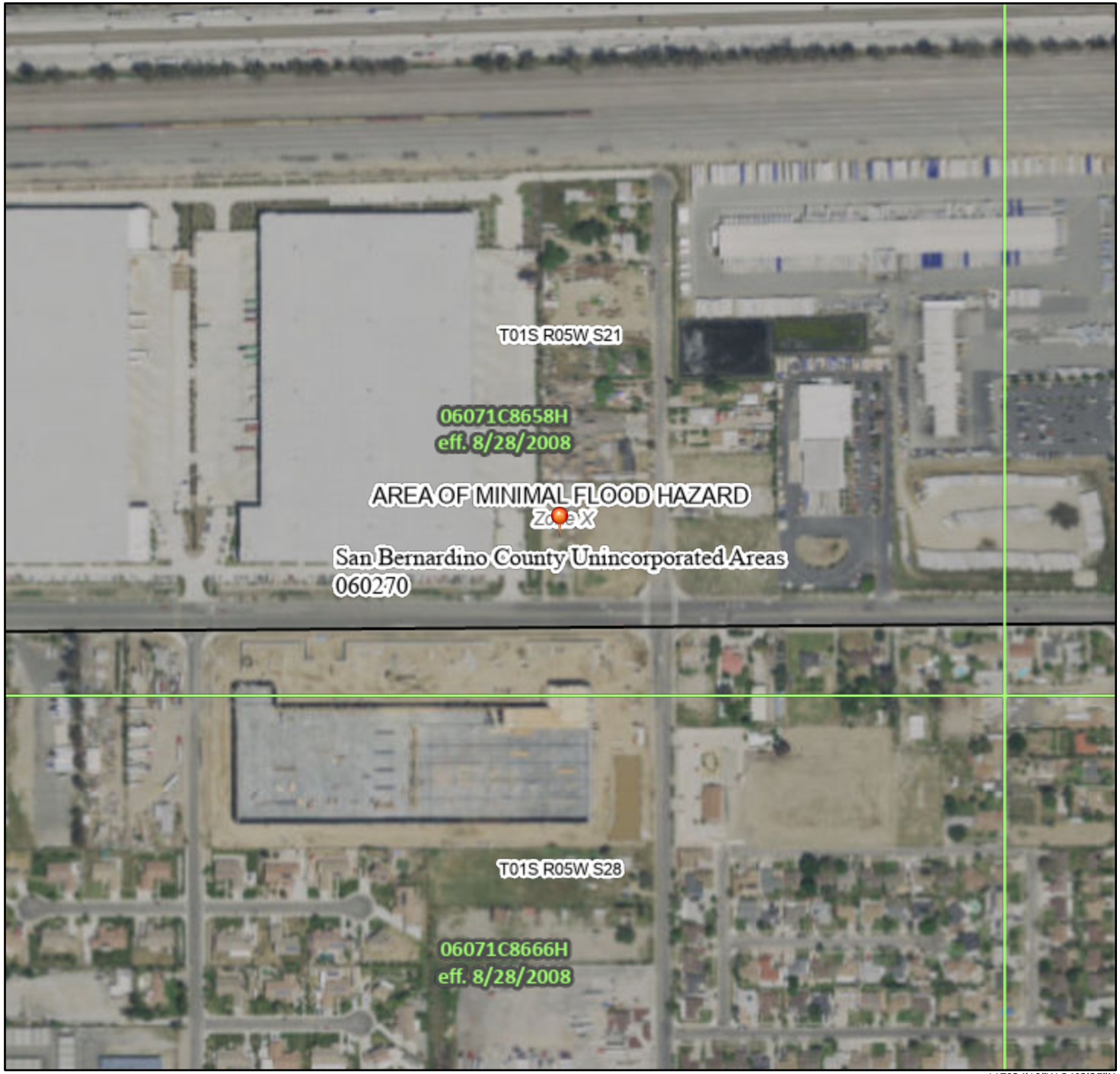
10486 LOCUST AVENUE & 18060 SLOVER AVENUE BLOOMINGTON, CA

EXHIBIT C: FIRM MAP

National Flood Hazard Layer FIRMette

FEMA

117°24'56"W 34°4'4"N



117°24'19"W 34°3'35"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

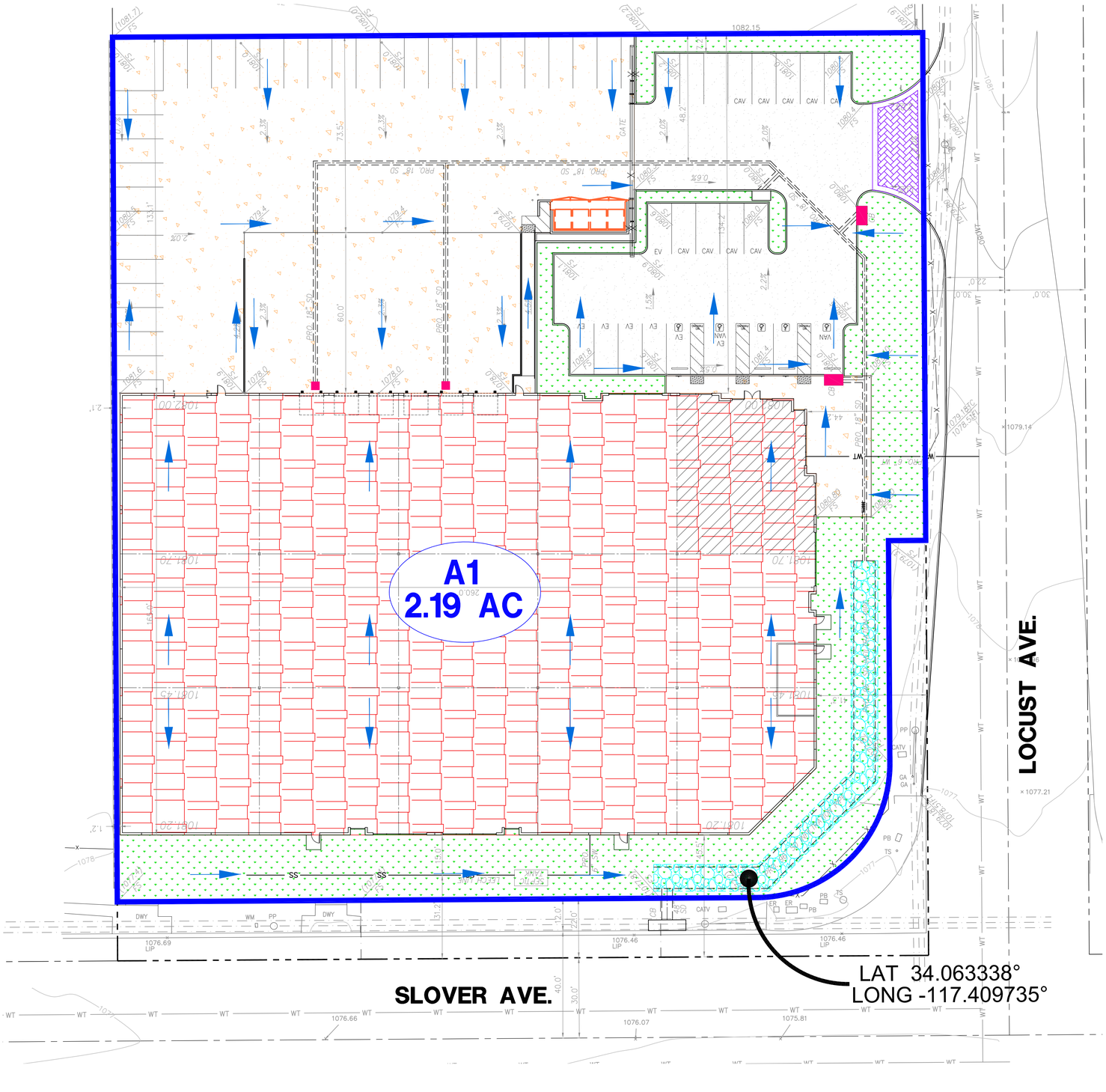
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/14/2022 at 8:40 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

EXHIBIT D: WQMP SITE PLAN

PRELIMINARY WQMP SITE PLAN

18060 SLOVER AVE
BLOOMINGTON, CA



NORTH

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

PROJECT DATA:

TOTAL SITE AREA OF PROPOSED DEVELOPMENT: 2.19 AC (95,320 SF)

BUILDING AREA: 40,708 SF
WALKWAYS / CONC. GUTTER / DOCK AREAS: 27,990 SF
DRIVEWAYS / DRIVE AISLES / PARKING AREAS: 11,358 SF

15,264 SF LANDSCAPING PROVIDED
(16% PERVIOUS AREA)

CURRENT USE: VACANT/RESIDENTIAL
PROPOSED USE: INDUSTRIAL

WATERSHED:
SANTA ANA RIVER

WQMP DCV CALCULATION

AREA 1

AREA – 2.19 AC (95,320 SF)
RUNOFF COEFFICIENT (84% IMPERVIOUS)
C = 0.858 * (.84)^3 –0.78 * (.84)^2 + 0.774 * (.84) + .04 = 0.648
2YR 1 HR STORM – 0.543 IN
P6 = 1.4807 * 0.543 = 0.804 IN
DCV = 95,320 SF * 0.648 * 0.804 IN / 12IN/FT * 1.963 = 8,124 CF

BMP VOLUME CALCULATION

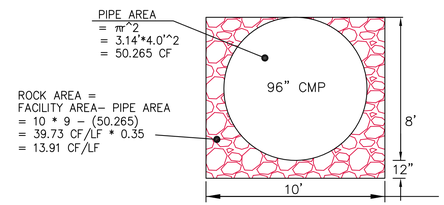
BMP VOLUME
PIPE CROSS SECTIONAL AREA = 50.265 CF/LF
ROCK CROSS SECTIONAL AREA = 39.73 CF/LF ROCK AREA * 0.35 = 13.91 CF/LF
TOTAL CROSS SECTIONAL AREA = 64.18 CF/LF * 175 LF = 11,232 CF
EFFECTIVE DEPTH = 11,232 CF / 1,750 SF BOTTOM = 6.42'

Vret = (Pdesign/12 * SAinf * Tfill) + (SAres * Dres * Nagg)
Pdesign = 4.375" MEASURED / 2.00 S.F. = 2.19"/HR
SAinf = 1,750 SF
SAres = 1,750 SF
Tfill = 3 HRS
Dres = EFFECTIVE DEPTH = 6.42'
Nagg = 1.0 (EFFECTIVE DEPTH ACCOUNTED FOR ROCK)
Vret = (2.19/12 * 1,750 * 3) + (1,750 * 6.42 * 1)
Vret = 12,193 CF
BMP VOLUME (12,193 CF) > DCV VOLUME (8,124 CF)

BMP LEGEND

AREA 1

- DRAINAGE AREAS
- FLOW DIRECTION
- UNDERGROUND INFILTRATION PIPE PER DETAIL HEREON
- LANDSCAPE AREA EFFICIENT IRRIGATION
  LANDSCAPE AREA RUNOFF–MINIMIZING DESIGN
- PROPOSED BUILDING
- ASPHALT CONCRETE DRIVE AISLES
- CONCRETE HARDSCAPE
- DECORATIVE PAVING
- CATCH BASIN WITH INSERT FILTER & STORM DRAIN STENCIL SIGNAGE
- TRASH ENCLOSURE



INFILTRATION BMP CROSS SECTION

1"=4'

XEBEC REALTY PARTNERS
3010 OLD RANCH PARKWAY, STE 470
SEAL BEACH, CA 90740
(714) 650–7111
CONTACT: MR. DANIEL RICKS

REGISTERED PROFESSIONAL ENGINEER FRED CORNWELL No. 45591 CIVIL STATE OF CALIFORNIA

FRED CORNWELL R.C.E. 45591 DATE

PREPARED BY:
CA ENGINEERING, INC.
Planning • Engineering • Surveying
13821 NEWPORT AVE., STE 110
TUSTIN, CA 92780
949-724-9480 949-724-9484 FAX

DATE	BY	REVISION

DATE Sep 19 2022
JOB NO. 251-76
Sht. C-1