Appendix I Preliminary Hydrology Report

Appendices

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ONE METRO WEST
City of Costa Mesa, CA

PRELIMINARY HYDROLOGY REPORT

Prepared For:

ROSE EQUITIES
18900 Teller Avenue
Irvine, CA 92612

Prepared By:

Urban Resource Corporation
23 Mauchly, Suite 110
Irvine, CA 92618

November 1, 2019

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Exp. 9-30-21

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INTRODUCTION

One Metro West Vesting Tentative Tract 19015, is located on Sunflower Avenue in the City of Costa Mesa, and is bounded by existing commercial to the west, existing commercial site SOCO to the east, Interstate 405 Highway to the south, and Sunflower Avenue to the north. The project has a total gross site acreage of approximately 15.2 acres and proposes three residential apartment buildings, a public park, and a tech building.

The development will propose onsite private PVC and private RCP storm drain to convey flows westerly and easterly, maintaining drainage patterns similar to the existing condition. An existing 66" RCP storm drain is available for connection onsite towards the west side of the project, and an existing private 24" RCP storm drain is available onsite for connection along the easterly edge of the project. Reference drawings for the existing 66" RCP storm drain and existing 24" RCP storm drain from the City of Costa Mesa and from Caltrans are included in Appendix C.

The purpose of this preliminary hydrology analysis is to assess the hydrology impacts resulting from development of the proposed apartment site, on the existing 66" CIPP and existing 24" RCP. The analysis conducted utilizes an identical watershed boundary for the existing condition and the developed condition to allow for comparison of the peak flow rates from an identical area. The boundary utilized includes the ultimate right-of-way and is the approximate drainage boundary for flows captured onsite.

PROJECT SETTING

The existing site consists of existing surface parking and vegetation, and an existing industrial building. The existing site is generally flat and is divided into two drainage areas, with a majority of the site draining westerly, and the remainder of the site draining easterly.

The site is located in the Santa Ana River Watershed and all runoff leaving the site ultimately drains to the Pacific Ocean.

This project is located in Zone X, outside of the 0.2% Annual Chance Flood Plain, per the FEMA Flood Insurance Rate Map (FIRM).

METHODOLOGY

The proposed condition rational method peak flows were analyzed using the Advance Engineering Software (AES) package for Orange County, which complies with the County of Orange Hydrology Manual, 1996 Addendum No. 1, 85% Upper Confidence Level Procedure. The software computes peak flows based on the Rational Method, and follows the requirements of the County of Orange Hydrology Manual. For modeling purposes, the site and all tributary areas of the site are divided into smaller subareas to more accurately model drainage patterns. Once all areas are divided into smaller subareas, initial subareas with flow patterns are determined for software use. All areas

and flow patterns are considered and used in the AES software for modeling, to provide peak flow rates. Additionally, the parameters for the rational method hydrology analysis for the existing and proposed conditions are listed below:

1) Storm Events – 10 year and 25 year (Existing and Proposed Condition)
2) Hydrologic Soil Type A and C (NRCS/OC Soils Map)
3) AMC II (10 year and 25 year)
4) Existing Condition Land Use – Commercial (Parking Lot, Existing Building), Public Park (Landscaped/Planted Area)
5) Proposed Condition Land Use – Commercial (Streets/Building) Apartment, Public Park

The hydrologic soil type for the project site is Type 'A' and Type 'C' per the County of Orange Hydrology Manual Soils Map and the NRCS Soils Map, provided herewith in Appendix C.

Hydrology data for the 10 year and 25 year storm event at Node 11519 per the City of Costa Mesa 2006 SDSMP is utilized as the upstream inflow (for the westerly 66" RCP storm drain system) prior to any project flows entering the existing 66" RCP storm drain. The tributary area from the project site, in the existing and proposed condition study, is then routed to the existing 66" RCP storm drain for calculation of the outflow. The total study area of the outflow does not include a majority of the drainage area from Drainage Area 11523 as depicted in the 2006 SDSMP. It only includes the portion within the project limits, so that a comparison between the existing condition and proposed condition peak flows can be made.

SDSMP hydrology data is not available for the existing private RCP storm drain located onsite along the easterly boundary. This study evaluates the approximate drainage area captured by the existing 18" and 24" RCP storm drain on the east side, and then evaluates the proposed drainage area that will outlet at the downstream end of the private existing 24" RCP storm drain onsite, to compare the peak flow rates for the two conditions. Note that there are no as-built drawings available from the City for the onsite RCP storm drain along the easterly boundary; thus, for the purpose of this study, assumptions are made for the existing pipe slope (S=0.5%), and an assumption is made for the invert at the downstream connection point. The existing storm drain will need to be potholed and surveyed for elevation to verify the point of connection invert elevation for use in the project storm drain improvement plan.

The cumulative tributary areas within the project site entering the existing 66" RCP storm drain and the existing 24" RCP storm drain is approximately 15.2 acres, and the existing and proposed condition hydrology calculations stop after the project drainage areas are captured in the two existing storm drain systems.

The subareas in the developed condition will be treated via Modular Wetland Biofiltration vaults (or approved similar), prior to outletting to the primary RCP storm drain system proposed for the development. Infiltration is not feasible for this project per the project Preliminary WQMP report, and therefore, treated stormwater is not retained onsite. This hydrology analysis does not include any onsite detention. Flows treated by

the Modular Wetland vaults will outlet directly into the proposed RCP storm drain system onsite. The Modular Wetland vaults will be sized to meet 85th percentile, 24-hour storm event flow rate as required per the County of Orange Model Water Quality Management Plan and the County of Orange Technical Guidance Document (TGD).

CONCLUSION

The existing condition and proposed condition analysis results for total peak flowrates, and other model parameters/results are provided below for the 10 year and 25 year storm event. Preliminary hydrology analysis of the developed condition indicates that there will not be an increase in the amount of storm flows discharging from the two outfall points modeled herewith, when compared to the existing condition hydrology analysis.

The very minor reduction in peak flow rate for the outfall point in the existing 66" CIPP can be attributed to the modeling parameters and the slightly higher area average Ap, and the slightly higher time of concentration. Regardless, the study indicates that the proposed development at the project outfall for the existing 66" CIPP is considered negligible. The minor reduction in peak flow rate for the outfall point in the existing 24" RCP can be attributed to the reduction in project tributary area, and an increase in the time of concentration due to the flat slope of the proposed storm drain in the model.

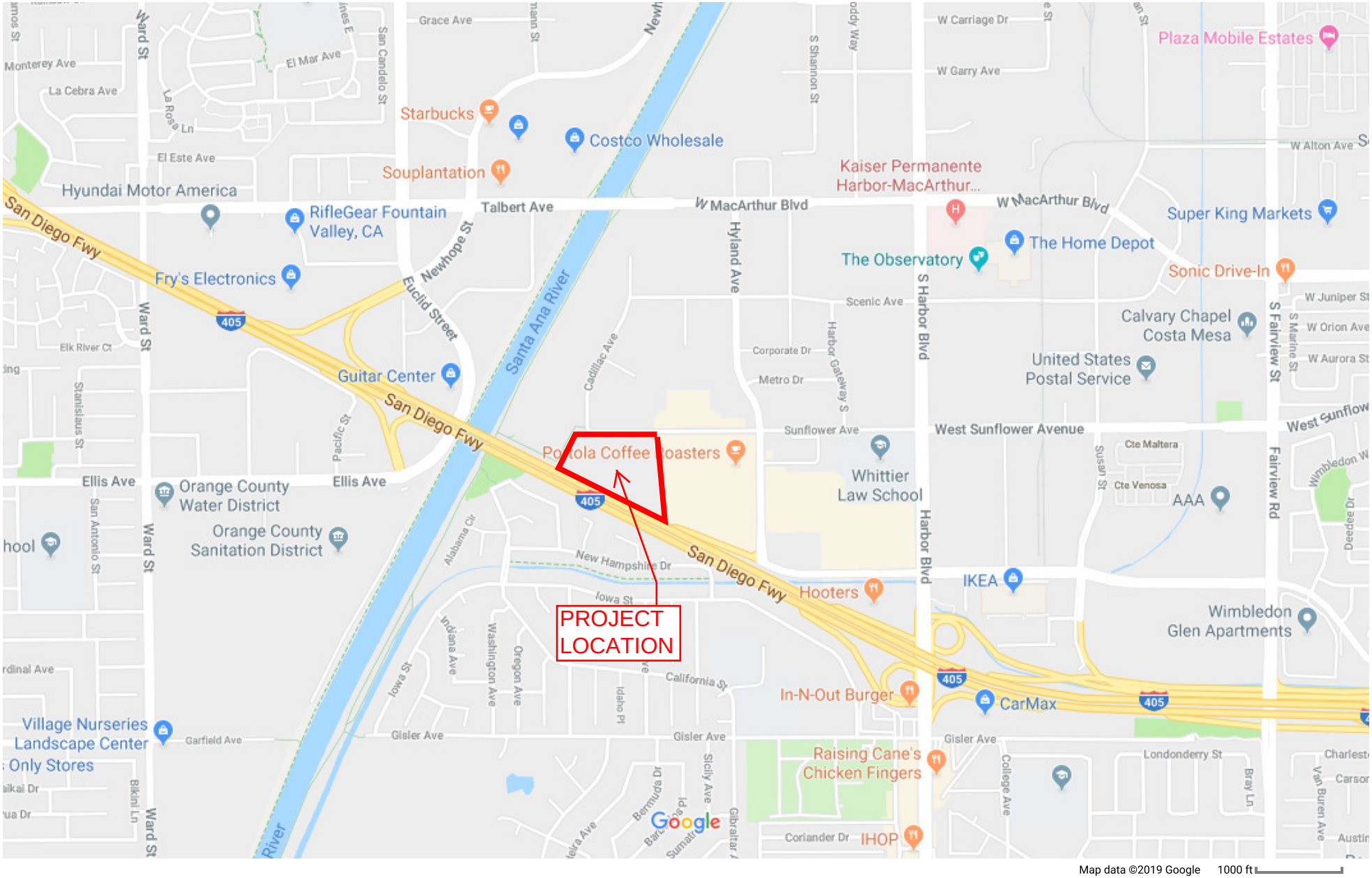
Therefore, it is concluded that the proposed development will have a negligible impact to the existing 66" CIPP and existing 24" RCP storm drain.

Calculations are provided in Appendix A and B.

Project Outfall Comparison Table

	Project Outfall: Ex. 66" CIPP		Project Outfall: Ex. 24" RCP	
	Existing Condition Node 33	Proposed Condition Node 9	Existing Condition Node 41	Proposed Condition Node 17
Q_{25} (cfs)	113.07	112.41	14.60	10.11
$T_{c\text{-}25yr}$(min)	23.05	23.19	10.17	13.52
i_{25} (in/hr)	2.03	2.02	3.23	2.75
Q_{10} (cfs)	89.23	88.44	12.15	8.36
$T_{c\text{-}10yr}$(min)	23.67	23.87	10.23	13.67
i_{10} (in/hr)	1.67	1.66	2.69	2.28
A_p (Area-Avg)	0.16	0.17	0.19	0.19
A_{total} (ac.)	74.60	75.50	5.10	4.20
$A_{Project\ Tributary}$ (ac.)	10.10	11.00	5.10	4.20

Google Maps ONE METRO WEST - PROJECT LOCATION



II. REFERENCES

1. Hydrology Manual, County of Orange, October 1986, 1996 Addendum No. 1.
2. County of Orange Local Drainage Manual, January 1996.
3. RATSCx (Rational Method Analysis), Advanced Engineering Software (AES), 2010.

APPENDICES

APPENDIX A

PROPOSED CONDITION HYDROLOGY CALCULATIONS
10 YEAR STORM EVENT
25 YEAR STORM EVENT

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
        (c) Copyright 1983-2011 Advanced Engineering Software (aes)
            Ver. 18.0  Release Date: 07/01/2011  License ID 1585

                          Analysis prepared by:

                        Urban Resource Corporation
                          23 Mauchly, Suite 110
                             Irvine, CA 92618


 ************************* DESCRIPTION OF STUDY *************************
* ONE METRO WEST                                                        *
* PROPOSED CONDITION HYDROLOGY                                          *
* 25 YEAR STORM EVENT                                                   *
 **************************************************************************

  FILE NAME: 653PR25.25
  TIME/DATE OF STUDY: 13:52 11/01/2019
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *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)
  *PIPE MAY BE SIZED TO HAVE A FLOW CAPACITY LESS THAN
   UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      3.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
  ELEVATION DATA: UPSTREAM(FEET) =     31.00  DOWNSTREAM(FEET) =     30.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.303
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.893
  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                 C        0.36      0.25     0.100    69    7.30
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.25
  TOTAL AREA(ACRES) =      0.36   PEAK FLOW RATE(CFS) =      1.25

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      5.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.89  DOWNSTREAM(FEET) =    23.39
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.2 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.07
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.25
 PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =    7.85
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     300.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.85
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.738
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        1.11      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.11      SUBAREA RUNOFF(CFS) =    3.71
 EFFECTIVE AREA(ACRES) =      1.47   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       4.91

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    23.39  DOWNSTREAM(FEET) =    21.54
 FLOW LENGTH(FEET) =   925.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.05
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.91
 PIPE TRAVEL TIME(MIN.) =   5.06    Tc(MIN.) =   12.90
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1225.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.90
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.821
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 C        7.85      0.25      0.200    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    7.85      SUBAREA RUNOFF(CFS) =   19.58
 EFFECTIVE AREA(ACRES) =      9.32   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        9.3       PEAK FLOW RATE(CFS) =      23.28

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 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) =    21.54  DOWNSTREAM(FEET) =    21.50
 FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.57
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.28
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   12.97
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1244.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.97
```

```
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.812
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                A        1.62      0.40      0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    1.62      SUBAREA RUNOFF(CFS) =    3.60
 EFFECTIVE AREA(ACRES) =     10.94   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =      26.81

****************************************************************************
 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.) =   12.97
 RAINFALL INTENSITY(INCH/HR) =   2.81
 AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.32
 AREA-AVERAGED Ap =  0.28
 EFFECTIVE STREAM AREA(ACRES) =      10.94
 TOTAL STREAM AREA(ACRES) =      10.94
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      26.81

****************************************************************************
 FLOW PROCESS FROM NODE      2.00 TO NODE      2.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN.) =   21.66   RAINFALL INTENSITY(INCH/HR) =  2.10
 EFFECTIVE AREA(ACRES) =    64.56
 TOTAL AREA(ACRES) =    64.56        PEAK FLOW RATE(CFS) =     93.36
 AREA-AVERAGED Fm(INCH/HR) =   0.06  AREA-AVERAGED Fp(INCH/HR) =   0.40
 AREA-AVERAGED Ap =  0.15
 NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
       CONFLUENCE ANALYSES.

****************************************************************************
 FLOW PROCESS FROM NODE      2.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    21.89  DOWNSTREAM(FEET) =    21.50
 FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.024
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.93
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      93.36
 PIPE TRAVEL TIME(MIN.) =   1.53    Tc(MIN.) =   23.19
 LONGEST FLOWPATH FROM NODE      2.00 TO NODE      9.00 =     360.00 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.) =   23.19
 RAINFALL INTENSITY(INCH/HR) =   2.02
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.15
 EFFECTIVE STREAM AREA(ACRES) =      64.56
 TOTAL STREAM AREA(ACRES) =      64.56
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      93.36

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

```
    1       26.81   12.97    2.812  0.32( 0.09) 0.28       10.9        1.00
    2       93.36   23.19    2.024  0.40( 0.06) 0.15       64.6        2.00

 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       99.98   12.97    2.812  0.37( 0.07) 0.18       47.1        1.00
    2      112.41   23.19    2.024  0.38( 0.06) 0.17       75.5        2.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     112.41    Tc(MIN.) =    23.19
 EFFECTIVE AREA(ACRES) =      75.50   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.17
 TOTAL AREA(ACRES) =       75.5
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1244.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     13.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
 ELEVATION DATA: UPSTREAM(FEET) =     30.50  DOWNSTREAM(FEET) =     30.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.389
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.599
 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                  C        0.29      0.25      0.100    69    8.39
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.93
 TOTAL AREA(ACRES) =      0.29   PEAK FLOW RATE(CFS) =      0.93

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    23.75  DOWNSTREAM(FEET) =    23.69
 FLOW LENGTH(FEET) =    10.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.02
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.93
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    8.44
 LONGEST FLOWPATH FROM NODE     11.00 TO NODE     15.00 =     210.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.44
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.586
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.15      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.48
 EFFECTIVE AREA(ACRES) =      0.44   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       1.41

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.69  DOWNSTREAM(FEET) =    22.36
  FLOW LENGTH(FEET) =   665.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.18
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.41
  PIPE TRAVEL TIME(MIN.) =   5.07    Tc(MIN.) =   13.52
  LONGEST FLOWPATH FROM NODE     11.00 TO NODE     17.00 =     875.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.52
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.747
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  C        3.72      0.25      0.200    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    3.72      SUBAREA RUNOFF(CFS) =    9.03
  EFFECTIVE AREA(ACRES) =      4.16   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =      10.11
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        4.2  TC(MIN.) =     13.52
  EFFECTIVE AREA(ACRES) =      4.16  AREA-AVERAGED Fm(INCH/HR)=  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 0.189
  PEAK FLOW RATE(CFS)   =      10.11
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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                          Analysis prepared by:

                        Urban Resource Corporation
                          23 Mauchly, Suite 110
                             Irvine, CA 92618


 ************************* DESCRIPTION OF STUDY *************************
* ONE METRO WEST                                                        *
* PROPOSED CONDITION HYDROLOGY                                          *
* 10 YEAR STORM EVENT                                                   *
 ************************************************************************

  FILE NAME: 653PR10.10
  TIME/DATE OF STUDY: 13:55 11/01/2019
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *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)
  *PIPE MAY BE SIZED TO HAVE A FLOW CAPACITY LESS THAN
   UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      3.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
  ELEVATION DATA: UPSTREAM(FEET) =     31.00  DOWNSTREAM(FEET) =     30.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.303
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.267
  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                 C        0.36      0.25      0.100    69    7.30
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.05
  TOTAL AREA(ACRES) =      0.36   PEAK FLOW RATE(CFS) =      1.05

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      5.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.89  DOWNSTREAM(FEET) =    23.39
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   7.0 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.85
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.05
 PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =    7.89
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     300.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.89
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.126
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        1.11      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.11      SUBAREA RUNOFF(CFS) =    3.10
 EFFECTIVE AREA(ACRES) =      1.47   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       4.10

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    23.39  DOWNSTREAM(FEET) =    21.54
 FLOW LENGTH(FEET) =   925.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.86
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.10
 PIPE TRAVEL TIME(MIN.) =   5.39    Tc(MIN.) =   13.28
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    1225.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.28
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.320
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                  C        7.85      0.25      0.200    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    7.85      SUBAREA RUNOFF(CFS) =   16.04
 EFFECTIVE AREA(ACRES) =      9.32   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        9.3       PEAK FLOW RATE(CFS) =      19.07

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 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) =    21.54  DOWNSTREAM(FEET) =    21.50
 FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.33
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.07
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   13.35
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1244.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.35
```

```
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.313
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 A        1.62      0.40      0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =     1.62      SUBAREA RUNOFF(CFS) =     2.88
 EFFECTIVE AREA(ACRES) =     10.94   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  0.28
 TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =      21.89

****************************************************************************
 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.) =   13.35
 RAINFALL INTENSITY(INCH/HR) =   2.31
 AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.32
 AREA-AVERAGED Ap =  0.28
 EFFECTIVE STREAM AREA(ACRES) =      10.94
 TOTAL STREAM AREA(ACRES) =      10.94
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.89

****************************************************************************
 FLOW PROCESS FROM NODE      2.00 TO NODE      2.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN.) =   21.92   RAINFALL INTENSITY(INCH/HR) =  1.74
 EFFECTIVE AREA(ACRES) =    64.56
 TOTAL AREA(ACRES) =    64.56        PEAK FLOW RATE(CFS) =     73.00
 AREA-AVERAGED Fm(INCH/HR) =   0.06  AREA-AVERAGED Fp(INCH/HR) =   0.40
 AREA-AVERAGED Ap =  0.15
 NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
       CONFLUENCE ANALYSES.

****************************************************************************
 FLOW PROCESS FROM NODE      2.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    21.89  DOWNSTREAM(FEET) =    21.50
 FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.024
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.07
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      73.00
 PIPE TRAVEL TIME(MIN.) =   1.95    Tc(MIN.) =   23.87
 LONGEST FLOWPATH FROM NODE      2.00 TO NODE      9.00 =     360.00 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.) =   23.87
 RAINFALL INTENSITY(INCH/HR) =   1.66
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.15
 EFFECTIVE STREAM AREA(ACRES) =      64.56
 TOTAL STREAM AREA(ACRES) =      64.56
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      73.00

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

```
    1       21.89   13.35    2.313  0.32( 0.09) 0.28      10.9        1.00
    2       73.00   23.87    1.657  0.40( 0.06) 0.15      64.6        2.00

 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       79.45   13.35    2.313  0.37( 0.07) 0.18      47.0        1.00
    2       88.44   23.87    1.657  0.38( 0.06) 0.17      75.5        2.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      88.44    Tc(MIN.) =    23.87
 EFFECTIVE AREA(ACRES) =      75.50   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.17
 TOTAL AREA(ACRES) =       75.5
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1244.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     13.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
 ELEVATION DATA: UPSTREAM(FEET) =     30.50  DOWNSTREAM(FEET) =     30.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.389
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.018
 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                  C        0.29      0.25      0.100    69    8.39
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.78
 TOTAL AREA(ACRES) =      0.29   PEAK FLOW RATE(CFS) =      0.78

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    23.75  DOWNSTREAM(FEET) =    23.69
 FLOW LENGTH(FEET) =    10.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.93
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.78
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    8.45
 LONGEST FLOWPATH FROM NODE     11.00 TO NODE     15.00 =     210.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.45
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.006
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.15      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.40
 EFFECTIVE AREA(ACRES) =      0.44   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       1.18

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
 ELEVATION DATA: UPSTREAM(FEET) =    23.69  DOWNSTREAM(FEET) =    22.36
 FLOW LENGTH(FEET) =   665.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.12
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.18
 PIPE TRAVEL TIME(MIN.) =   5.22    Tc(MIN.) =   13.67
 LONGEST FLOWPATH FROM NODE     11.00 TO NODE     17.00 =     875.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.67
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.282
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 C        3.72      0.25      0.200    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    3.72      SUBAREA RUNOFF(CFS) =    7.47
 EFFECTIVE AREA(ACRES) =      4.16   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =       8.36
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        4.2  TC(MIN.) =     13.67
 EFFECTIVE AREA(ACRES) =      4.16  AREA-AVERAGED Fm(INCH/HR)=  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 0.189
 PEAK FLOW RATE(CFS)   =       8.36
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

APPENDIX B

EXISTING CONDITION HYDROLOGY CALCULATIONS
10 YEAR STORM EVENT
25 YEAR STORM EVENT

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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                        Analysis prepared by:

                      Urban Resource Corporation
                        23 Mauchly, Suite 110
                           Irvine, CA 92618


 ************************* DESCRIPTION OF STUDY *************************
* ONE METRO WEST                                                        *
* EXISTING CONDITION HYDROLOGY                                          *
* 25 YEAR STORM EVENT                                                   *
 ************************************************************************

  FILE NAME: 653EX25.25
  TIME/DATE OF STUDY: 13:44 11/01/2019
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *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)
  *PIPE MAY BE SIZED TO HAVE A FLOW CAPACITY LESS THAN
   UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   21.66   RAINFALL INTENSITY(INCH/HR) =  2.10
  EFFECTIVE AREA(ACRES) =    64.56
  TOTAL AREA(ACRES) =    64.56        PEAK FLOW RATE(CFS) =     93.36
  AREA-AVERAGED Fm(INCH/HR) =   0.06  AREA-AVERAGED Fp(INCH/HR) =   0.40
  AREA-AVERAGED Ap =  0.15
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

**************************************************************************
  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.) =   21.66
  RAINFALL INTENSITY(INCH/HR) =   2.10
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.40
  AREA-AVERAGED Ap =  0.15
  EFFECTIVE STREAM AREA(ACRES) =      64.56
  TOTAL STREAM AREA(ACRES) =      64.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      93.36
```

```
****************************************************************************
 FLOW PROCESS FROM NODE      1.00 TO NODE      3.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =     30.70  DOWNSTREAM(FEET) =     28.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.108
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.669
 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                  C        2.22      0.25      0.100    69    8.11
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      7.28
 TOTAL AREA(ACRES) =      2.22   PEAK FLOW RATE(CFS) =      7.28

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      5.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   28.70  DOWNSTREAM ELEVATION(FEET) =   27.40
 STREET LENGTH(FEET) =   460.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.29
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.52
   HALFSTREET FLOOD WIDTH(FEET) =   20.98
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.79
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.94
 STREET FLOW TRAVEL TIME(MIN.) =   4.27   Tc(MIN.) =   12.38
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.887
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.01      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.03
 EFFECTIVE AREA(ACRES) =      2.23    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.2        PEAK FLOW RATE(CFS) =       7.28
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  20.98
 FLOW VELOCITY(FEET/SEC.) =  1.79   DEPTH*VELOCITY(FT*FT/SEC.) =   0.94
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    23.47  DOWNSTREAM(FEET) =    21.89
 FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.024
 DEPTH OF FLOW IN  36.0 INCH PIPE IS   8.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.32
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.28
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.58
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =     824.00 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.) =   12.58
 RAINFALL INTENSITY(INCH/HR) =   2.86
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       2.23
 TOTAL STREAM AREA(ACRES) =       2.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.28

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       93.36   21.66    2.104  0.40( 0.06) 0.15      64.6       9.00
     2        7.28   12.58    2.861  0.25( 0.03) 0.10       2.2       1.00

 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       81.61   12.58    2.861  0.39( 0.06) 0.15      39.7       1.00
     2       98.70   21.66    2.104  0.40( 0.06) 0.15      66.8       9.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      98.70    Tc(MIN.) =    21.66
 EFFECTIVE AREA(ACRES) =      66.79   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.15
 TOTAL AREA(ACRES) =       66.8
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =     824.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     15.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    21.89  DOWNSTREAM(FEET) =    21.80
 FLOW LENGTH(FEET) =    76.00   MANNING'S N =  0.024
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.15
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      98.70
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   21.97
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =     900.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =   21.97
 RAINFALL INTENSITY(INCH/HR) =   2.09
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.15
 EFFECTIVE STREAM AREA(ACRES) =      66.79
 TOTAL STREAM AREA(ACRES) =      66.79
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      98.70

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     13.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
 ELEVATION DATA: UPSTREAM(FEET) =     29.80  DOWNSTREAM(FEET) =     27.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.032
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.337
 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                  C        0.95      0.25      0.100    69    6.03
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      3.69
 TOTAL AREA(ACRES) =      0.95   PEAK FLOW RATE(CFS) =      3.69

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    22.47  DOWNSTREAM(FEET) =    21.78
 FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.84
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.69
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    6.22
 LONGEST FLOWPATH FROM NODE     11.00 TO NODE     15.00 =     267.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =    6.22
 RAINFALL INTENSITY(INCH/HR) =   4.26
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.95
 TOTAL STREAM AREA(ACRES) =       0.95
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.69

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       81.61   12.95    2.815  0.39( 0.06) 0.15      39.7       1.00
     1       98.70   21.97    2.087  0.40( 0.06) 0.15      66.8       9.00
     2        3.69    6.22    4.262  0.25( 0.03) 0.10       0.9      11.00

 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       63.48    6.22    4.262  0.39( 0.06) 0.14      20.0      11.00
     2       84.03   12.95    2.815  0.39( 0.06) 0.15      40.7       1.00
     3      100.49   21.97    2.087  0.40( 0.06) 0.15      67.7       9.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     100.49    Tc(MIN.) =    21.97
 EFFECTIVE AREA(ACRES) =      67.74   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.15
 TOTAL AREA(ACRES) =      67.7
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =     900.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     21.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =    21.80  DOWNSTREAM(FEET) =    21.78
 FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.024
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.23
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     100.49
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   22.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =     908.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   22.00
 RAINFALL INTENSITY(INCH/HR) =   2.09
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.15
 EFFECTIVE STREAM AREA(ACRES) =      67.74
 TOTAL STREAM AREA(ACRES) =      67.74
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     100.49

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     19.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   175.00
 ELEVATION DATA: UPSTREAM(FEET) =     31.30  DOWNSTREAM(FEET) =     29.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.811
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.430
 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                 C        2.97      0.25      0.100    69    5.81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =     11.78
 TOTAL AREA(ACRES) =      2.97   PEAK FLOW RATE(CFS) =     11.78

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    22.07  DOWNSTREAM(FEET) =    21.78
 FLOW LENGTH(FEET) =    72.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.60
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.78
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    6.03
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     21.00 =     247.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 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.) =    6.03
 RAINFALL INTENSITY(INCH/HR) =   4.34
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       2.97
 TOTAL STREAM AREA(ACRES) =       2.97
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.78
```

```
 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       63.48    6.26    4.249  0.39( 0.06) 0.14      20.0      11.00
     1       84.03   12.98    2.811  0.39( 0.06) 0.15      40.7       1.00
     1      100.49   22.00    2.086  0.40( 0.06) 0.15      67.7       9.00
     2       11.78    6.03    4.340  0.25( 0.03) 0.10       3.0      17.00

 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       74.25    6.03    4.340  0.38( 0.05) 0.14      22.3      17.00
     2       75.01    6.26    4.249  0.38( 0.05) 0.14      23.0      11.00
     3       91.63   12.98    2.811  0.39( 0.06) 0.14      43.7       1.00
     4      106.11   22.00    2.086  0.39( 0.06) 0.15      70.7       9.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     106.11    Tc(MIN.) =    22.00
 EFFECTIVE AREA(ACRES) =      70.71   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.15
 TOTAL AREA(ACRES) =       70.7
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =     908.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     27.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    21.78  DOWNSTREAM(FEET) =    21.64
 FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.024
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.47
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     106.11
 PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   22.47
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     27.00 =    1035.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   22.47
 RAINFALL INTENSITY(INCH/HR) =   2.06
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.39
 AREA-AVERAGED Ap =  0.15
 EFFECTIVE STREAM AREA(ACRES) =      70.71
 TOTAL STREAM AREA(ACRES) =      70.71
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     106.11

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     25.00 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) =     28.80  DOWNSTREAM(FEET) =     26.40

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.158
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.740
 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                 C        1.15      0.25      0.100    69    5.16
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      4.88
```

```
 TOTAL AREA(ACRES) =      1.15   PEAK FLOW RATE(CFS) =      4.88

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     27.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    22.61  DOWNSTREAM(FEET) =    21.64
 FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.33
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.88
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    5.41
 LONGEST FLOWPATH FROM NODE     23.00 TO NODE     27.00 =     247.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 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.) =    5.41
 RAINFALL INTENSITY(INCH/HR) =   4.61
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       1.15
 TOTAL STREAM AREA(ACRES) =       1.15
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.88

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       74.25    6.70    4.086  0.38( 0.05) 0.14      22.3      17.00
     1       75.01    6.93    4.011  0.38( 0.05) 0.14      23.0      11.00
     1       91.63   13.53    2.746  0.39( 0.06) 0.14      43.7       1.00
     1      106.11   22.47    2.061  0.39( 0.06) 0.15      70.7       9.00
     2        4.88    5.41    4.612  0.25( 0.03) 0.10       1.1      23.00

 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       72.65    5.41    4.612  0.37( 0.05) 0.14      19.1      23.00
     2       78.57    6.70    4.086  0.37( 0.05) 0.14      23.4      17.00
     3       79.25    6.93    4.011  0.37( 0.05) 0.14      24.2      11.00
     4       94.53   13.53    2.746  0.38( 0.05) 0.14      44.8       1.00
     5      108.28   22.47    2.061  0.39( 0.06) 0.14      71.9       9.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     108.28    Tc(MIN.) =    22.47
 EFFECTIVE AREA(ACRES) =      71.86   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.14
 TOTAL AREA(ACRES) =       71.9
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     27.00 =    1035.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     33.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    21.64  DOWNSTREAM(FEET) =    21.45
 FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.024
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.56
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     108.28
 PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =   23.05
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    1192.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 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.) =   23.05
 RAINFALL INTENSITY(INCH/HR) =   2.03
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.39
 AREA-AVERAGED Ap =  0.14
 EFFECTIVE STREAM AREA(ACRES) =      71.86
 TOTAL STREAM AREA(ACRES) =      71.86
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     108.28

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
 ELEVATION DATA: UPSTREAM(FEET) =     36.90  DOWNSTREAM(FEET) =     28.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.356
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.211
 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.)
 PUBLIC PARK                 C        1.54      0.25      0.850    69   10.10
 COMMERCIAL                  C        1.18      0.25      0.100    69    6.36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.525
 SUBAREA RUNOFF(CFS) =      9.99
 TOTAL AREA(ACRES) =      2.72   PEAK FLOW RATE(CFS) =      9.99

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    22.50  DOWNSTREAM(FEET) =    21.45
 FLOW LENGTH(FEET) =   133.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.74
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.99
 PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =    6.69
 LONGEST FLOWPATH FROM NODE     29.00 TO NODE     33.00 =     453.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 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.) =    6.69
 RAINFALL INTENSITY(INCH/HR) =   4.09
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.52
 EFFECTIVE STREAM AREA(ACRES) =       2.72
 TOTAL STREAM AREA(ACRES) =       2.72
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.99

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1       72.65    6.27    4.244  0.37( 0.05) 0.14      19.1       23.00
     1       78.57    7.49    3.836  0.37( 0.05) 0.14      23.4       17.00
     1       79.25    7.71    3.775  0.37( 0.05) 0.14      24.2       11.00
     1       94.53   14.19    2.673  0.38( 0.05) 0.14      44.8        1.00
     1      108.28   23.05    2.031  0.39( 0.06) 0.14      71.9        9.00
```

```
    2        9.99    6.69    4.092  0.25( 0.13) 0.52       2.7       29.00

 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       82.38    6.27    4.244  0.33( 0.06) 0.18      21.7       23.00
     2       84.65    6.69    4.092  0.33( 0.06) 0.18      23.3       29.00
     3       87.91    7.49    3.836  0.33( 0.06) 0.18      26.1       17.00
     4       88.44    7.71    3.775  0.34( 0.06) 0.18      26.9       11.00
     5      100.94   14.19    2.673  0.36( 0.06) 0.16      47.5        1.00
     6      113.07   23.05    2.031  0.37( 0.06) 0.16      74.6        9.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     113.07    Tc(MIN.) =    23.05
 EFFECTIVE AREA(ACRES) =      74.58   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =       74.6
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    1192.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     35.00 TO NODE     37.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =     30.00  DOWNSTREAM(FEET) =     27.90

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.030
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.689
 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                  C        0.68      0.25      0.100    69    8.03
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      2.24
 TOTAL AREA(ACRES) =      0.68   PEAK FLOW RATE(CFS) =      2.24

****************************************************************************
 FLOW PROCESS FROM NODE     37.00 TO NODE     39.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    24.90  DOWNSTREAM(FEET) =    23.30
 FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.44
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.24
 PIPE TRAVEL TIME(MIN.) =   1.57    Tc(MIN.) =    9.60
 LONGEST FLOWPATH FROM NODE     35.00 TO NODE     39.00 =     624.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.60
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.335
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        3.83      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    3.83      SUBAREA RUNOFF(CFS) =   11.41
 EFFECTIVE AREA(ACRES) =      4.51   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        4.5       PEAK FLOW RATE(CFS) =      13.43

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     41.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    23.30  DOWNSTREAM(FEET) =    22.36
  FLOW LENGTH(FEET) =   188.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.46
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.43
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =   10.17
  LONGEST FLOWPATH FROM NODE     35.00 TO NODE     41.00 =     812.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.17
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.227
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               C        0.59      0.25     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    1.60
  EFFECTIVE AREA(ACRES) =      5.10   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =        5.1       PEAK FLOW RATE(CFS) =      14.60
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.1  TC(MIN.) =     10.17
  EFFECTIVE AREA(ACRES) =      5.10  AREA-AVERAGED Fm(INCH/HR)=  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 0.187
  PEAK FLOW RATE(CFS)   =      14.60
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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                          Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* ONE METRO WEST                                                        *
* EXISTING CONDITION HYDROLOGY                                          *
* 10 YEAR STORM EVENT                                                   *
 ************************************************************************

  FILE NAME: 653EX10.10
  TIME/DATE OF STUDY: 13:48 11/01/2019
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *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)
   *PIPE MAY BE SIZED TO HAVE A FLOW CAPACITY LESS THAN
    UPSTREAM TRIBUTARY PIPE.*
   *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   21.92   RAINFALL INTENSITY(INCH/HR) =  1.74
  EFFECTIVE AREA(ACRES) =    64.56
  TOTAL AREA(ACRES) =    64.56        PEAK FLOW RATE(CFS) =     73.00
  AREA-AVERAGED Fm(INCH/HR) =   0.06  AREA-AVERAGED Fp(INCH/HR) =   0.40
  AREA-AVERAGED Ap =  0.15
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

**************************************************************************
  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.) =   21.92
  RAINFALL INTENSITY(INCH/HR) =   1.74
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.40
  AREA-AVERAGED Ap =  0.15
  EFFECTIVE STREAM AREA(ACRES) =      64.56
  TOTAL STREAM AREA(ACRES) =      64.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      73.00
```

```
****************************************************************************
 FLOW PROCESS FROM NODE      1.00 TO NODE      3.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =     30.70  DOWNSTREAM(FEET) =     28.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.108
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.077
 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                  C        2.22      0.25      0.100    69    8.11
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      6.10
 TOTAL AREA(ACRES) =      2.22   PEAK FLOW RATE(CFS) =      6.10

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      5.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =   28.70  DOWNSTREAM ELEVATION(FEET) =   27.40
 STREET LENGTH(FEET) =   460.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.11
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.50
   HALFSTREET FLOOD WIDTH(FEET) =   18.54
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.72
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.85
 STREET FLOW TRAVEL TIME(MIN.) =   4.46   Tc(MIN.) =   12.57
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.393
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  C        0.01      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.01      SUBAREA RUNOFF(CFS) =    0.02
 EFFECTIVE AREA(ACRES) =      2.23    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.2        PEAK FLOW RATE(CFS) =       6.10
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.50   HALFSTREET FLOOD WIDTH(FEET) =  18.54
 FLOW VELOCITY(FEET/SEC.) =  1.71   DEPTH*VELOCITY(FT*FT/SEC.) =   0.85
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    23.47  DOWNSTREAM(FEET) =    21.89
 FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.024
 DEPTH OF FLOW IN  36.0 INCH PIPE IS   8.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.05
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.10
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   12.78
```

```
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =     824.00 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.) =   12.78
 RAINFALL INTENSITY(INCH/HR) =   2.37
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       2.23
 TOTAL STREAM AREA(ACRES) =       2.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.10

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1       73.00   21.92    1.741  0.40( 0.06) 0.15      64.6        9.00
     2        6.10   12.78    2.371  0.25( 0.03) 0.10       2.2        1.00

 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       64.64   12.78    2.371  0.39( 0.06) 0.15      39.9        1.00
     2       77.46   21.92    1.741  0.40( 0.06) 0.15      66.8        9.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      77.46    Tc(MIN.) =    21.92
 EFFECTIVE AREA(ACRES) =      66.79   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.15
 TOTAL AREA(ACRES) =      66.8
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =     824.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     15.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    21.89  DOWNSTREAM(FEET) =    21.80
 FLOW LENGTH(FEET) =    76.00   MANNING'S N =  0.024
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.26
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      77.46
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   22.31
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =     900.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   22.31
 RAINFALL INTENSITY(INCH/HR) =   1.72
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.15
 EFFECTIVE STREAM AREA(ACRES) =      66.79
 TOTAL STREAM AREA(ACRES) =      66.79
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      77.46

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     13.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
 ELEVATION DATA: UPSTREAM(FEET) =     29.80  DOWNSTREAM(FEET) =     27.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.032
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.646
 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                  C        0.95      0.25      0.100    69    6.03
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      3.10
 TOTAL AREA(ACRES) =      0.95   PEAK FLOW RATE(CFS) =      3.10

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    22.47  DOWNSTREAM(FEET) =    21.78
 FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.69
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.10
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    6.23
 LONGEST FLOWPATH FROM NODE     11.00 TO NODE     15.00 =     267.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 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.) =    6.23
 RAINFALL INTENSITY(INCH/HR) =   3.58
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.95
 TOTAL STREAM AREA(ACRES) =       0.95
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.10

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       64.64   13.25    2.323  0.39( 0.06) 0.15      39.9       1.00
     1       77.46   22.31    1.723  0.40( 0.06) 0.15      66.8       9.00
     2        3.10    6.23    3.579  0.25( 0.03) 0.10       0.9      11.00

 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       50.34    6.23    3.579  0.39( 0.06) 0.14      19.7      11.00
     2       66.64   13.25    2.323  0.39( 0.06) 0.15      40.8       1.00
     3       78.94   22.31    1.723  0.40( 0.06) 0.15      67.7       9.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      78.94    Tc(MIN.) =    22.31
 EFFECTIVE AREA(ACRES) =      67.74   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.15
 TOTAL AREA(ACRES) =       67.7
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     15.00 =     900.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     21.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =    21.80  DOWNSTREAM(FEET) =    21.78
 FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.024
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  49.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.12
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      78.94
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   22.34
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =     908.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   22.34
 RAINFALL INTENSITY(INCH/HR) =   1.72
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.15
 EFFECTIVE STREAM AREA(ACRES) =      67.74
 TOTAL STREAM AREA(ACRES) =      67.74
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      78.94

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     19.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   175.00
 ELEVATION DATA: UPSTREAM(FEET) =     31.30  DOWNSTREAM(FEET) =     29.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.811
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.724
 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                C        2.97      0.25     0.100    69    5.81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      9.89
 TOTAL AREA(ACRES) =      2.97   PEAK FLOW RATE(CFS) =      9.89

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    22.07  DOWNSTREAM(FEET) =    21.78
 FLOW LENGTH(FEET) =    72.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.29
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      9.89
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    6.04
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     21.00 =     247.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 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.) =    6.04
 RAINFALL INTENSITY(INCH/HR) =   3.64
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       2.97
 TOTAL STREAM AREA(ACRES) =       2.97
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.89
```

```
 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1       50.34    6.26    3.568  0.39( 0.06) 0.14      19.7       11.00
     1       66.64   13.28    2.319  0.39( 0.06) 0.15      40.8        1.00
     1       78.94   22.34    1.722  0.40( 0.06) 0.15      67.7        9.00
     2        9.89    6.04    3.644  0.25( 0.03) 0.10       3.0       17.00

 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       59.47    6.04    3.644  0.38( 0.05) 0.14      22.0       17.00
     2       60.03    6.26    3.568  0.38( 0.05) 0.14      22.7       11.00
     3       72.91   13.28    2.319  0.39( 0.06) 0.14      43.8        1.00
     4       83.58   22.34    1.722  0.39( 0.06) 0.15      70.7        9.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      83.58    Tc(MIN.) =    22.34
 EFFECTIVE AREA(ACRES) =      70.71   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.15
 TOTAL AREA(ACRES) =       70.7
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     21.00 =     908.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     27.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    21.78  DOWNSTREAM(FEET) =    21.64
 FLOW LENGTH(FEET) =   127.00   MANNING'S N =  0.024
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.52
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      83.58
 PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =   22.94
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     27.00 =    1035.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   22.94
 RAINFALL INTENSITY(INCH/HR) =   1.70
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.39
 AREA-AVERAGED Ap =  0.15
 EFFECTIVE STREAM AREA(ACRES) =      70.71
 TOTAL STREAM AREA(ACRES) =      70.71
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      83.58

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     25.00 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) =     28.80  DOWNSTREAM(FEET) =     26.40

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.158
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.988
 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                  C        1.15      0.25      0.100    69    5.16
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      4.10
 TOTAL AREA(ACRES) =      1.15   PEAK FLOW RATE(CFS) =      4.10
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     27.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    22.61  DOWNSTREAM(FEET) =    21.64
 FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.08
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.10
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    5.42
 LONGEST FLOWPATH FROM NODE     23.00 TO NODE     27.00 =     247.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 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.) =    5.42
 RAINFALL INTENSITY(INCH/HR) =   3.87
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       1.15
 TOTAL STREAM AREA(ACRES) =       1.15
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.10

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       59.47    6.88    3.380  0.38( 0.05) 0.14      22.0      17.00
     1       60.03    7.10    3.320  0.38( 0.05) 0.14      22.7      11.00
     1       72.91   13.97    2.253  0.39( 0.06) 0.14      43.8       1.00
     1       83.58   22.94    1.696  0.39( 0.06) 0.15      70.7       9.00
     2        4.10    5.42    3.875  0.25( 0.03) 0.10       1.1      23.00

 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       57.92    5.42    3.875  0.37( 0.05) 0.14      18.5      23.00
     2       63.04    6.88    3.380  0.37( 0.05) 0.14      23.1      17.00
     3       63.54    7.10    3.320  0.37( 0.05) 0.14      23.8      11.00
     4       75.28   13.97    2.253  0.38( 0.05) 0.14      45.0       1.00
     5       85.36   22.94    1.696  0.39( 0.06) 0.14      71.9       9.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      85.36    Tc(MIN.) =    22.94
 EFFECTIVE AREA(ACRES) =      71.86   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.14
 TOTAL AREA(ACRES) =       71.9
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     27.00 =    1035.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     33.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    21.64  DOWNSTREAM(FEET) =    21.45
 FLOW LENGTH(FEET) =   157.00   MANNING'S N =  0.024
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.59
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      85.36
 PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   23.67
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    1192.00 FEET.

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

```
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 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.) =   23.67
 RAINFALL INTENSITY(INCH/HR) =   1.67
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.39
 AREA-AVERAGED Ap =  0.14
 EFFECTIVE STREAM AREA(ACRES) =      71.86
 TOTAL STREAM AREA(ACRES) =      71.86
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      85.36

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
 ELEVATION DATA: UPSTREAM(FEET) =     36.90  DOWNSTREAM(FEET) =     28.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.356
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.538
 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.)
 PUBLIC PARK                C        1.54      0.25     0.850    69   10.10
 COMMERCIAL                 C        1.18      0.25     0.100    69    6.36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.525
 SUBAREA RUNOFF(CFS) =      8.34
 TOTAL AREA(ACRES) =      2.72   PEAK FLOW RATE(CFS) =      8.34

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    22.50  DOWNSTREAM(FEET) =    21.45
 FLOW LENGTH(FEET) =   133.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.57
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.34
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    6.69
 LONGEST FLOWPATH FROM NODE     29.00 TO NODE     33.00 =     453.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 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.) =    6.69
 RAINFALL INTENSITY(INCH/HR) =   3.43
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.52
 EFFECTIVE STREAM AREA(ACRES) =       2.72
 TOTAL STREAM AREA(ACRES) =       2.72
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.34

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1       57.92    6.33    3.545  0.37( 0.05) 0.14      18.5      23.00
     1       63.04    7.87    3.130  0.37( 0.05) 0.14      23.1      17.00
     1       63.54    8.08    3.083  0.37( 0.05) 0.14      23.8      11.00
     1       75.28   14.80    2.180  0.38( 0.05) 0.14      45.0       1.00
     1       85.36   23.67    1.666  0.39( 0.06) 0.14      71.9       9.00
     2        8.34    6.69    3.435  0.25( 0.13) 0.52       2.7      29.00
```

```
 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       66.08    6.33    3.545  0.33( 0.06) 0.18      21.0      23.00
     2       67.46    6.69    3.435  0.33( 0.06) 0.18      22.3      29.00
     3       70.61    7.87    3.130  0.33( 0.06) 0.18      25.8      17.00
     4       70.99    8.08    3.083  0.33( 0.06) 0.18      26.5      11.00
     5       80.45   14.80    2.180  0.36( 0.06) 0.16      47.7       1.00
     6       89.23   23.67    1.666  0.37( 0.06) 0.16      74.6       9.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      89.23    Tc(MIN.) =    23.67
 EFFECTIVE AREA(ACRES) =      74.58   AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =       74.6
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     33.00 =    1192.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     35.00 TO NODE     37.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =     30.00  DOWNSTREAM(FEET) =     27.90

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.030
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.094
 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                 C        0.68      0.25      0.100    69    8.03
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.88
 TOTAL AREA(ACRES) =      0.68   PEAK FLOW RATE(CFS) =      1.88

****************************************************************************
 FLOW PROCESS FROM NODE     37.00 TO NODE     39.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    24.90  DOWNSTREAM(FEET) =    23.30
 FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.35
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.88
 PIPE TRAVEL TIME(MIN.) =   1.61    Tc(MIN.) =    9.64
 LONGEST FLOWPATH FROM NODE     35.00 TO NODE     39.00 =     624.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.64
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.787
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        3.83      0.25      0.100    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    3.83      SUBAREA RUNOFF(CFS) =    9.52
 EFFECTIVE AREA(ACRES) =      4.51   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        4.5       PEAK FLOW RATE(CFS) =      11.21

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
```

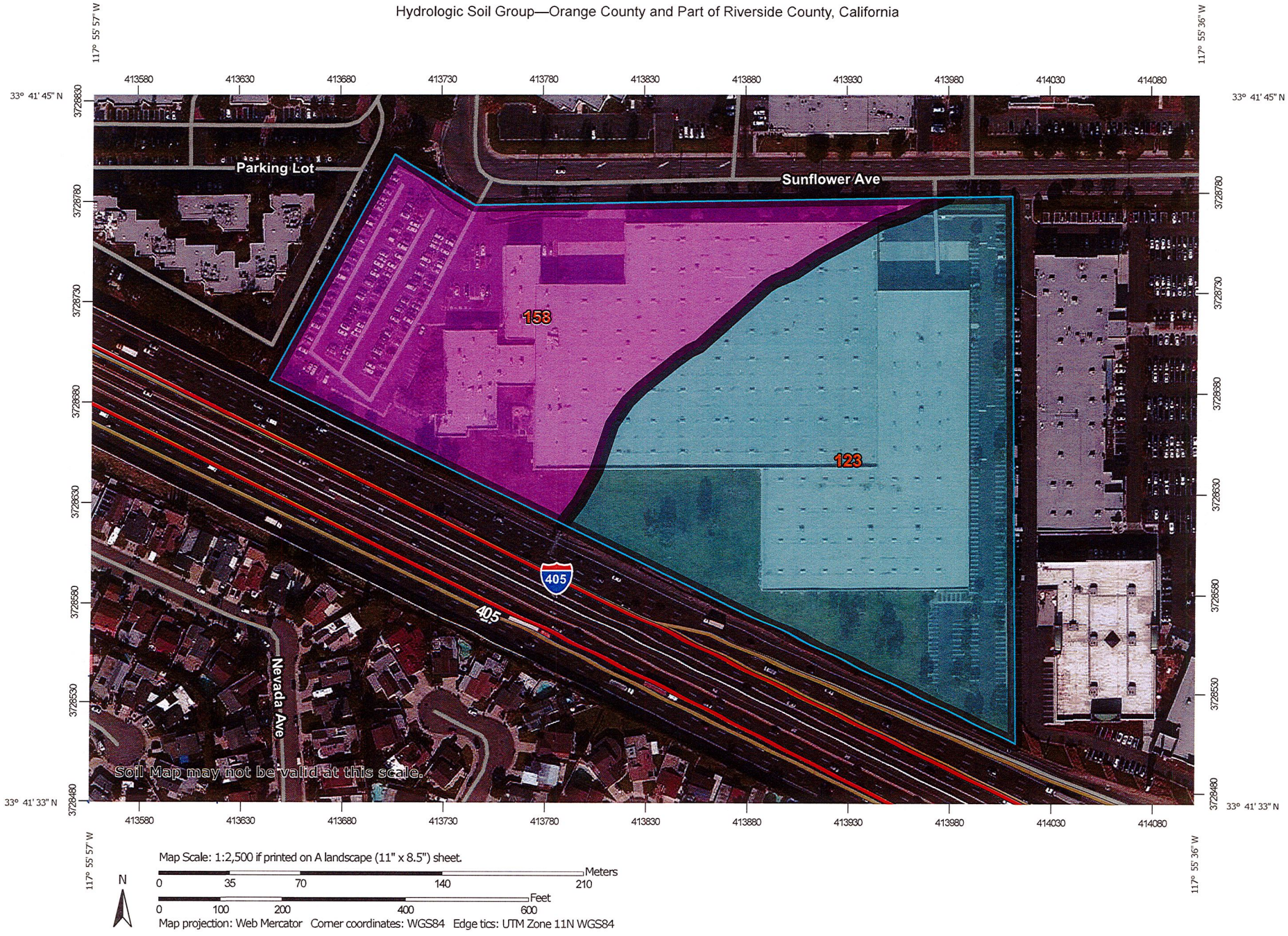
```
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    23.30  DOWNSTREAM(FEET) =    22.36
 FLOW LENGTH(FEET) =   188.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.29
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.21
 PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   10.23
 LONGEST FLOWPATH FROM NODE     35.00 TO NODE     41.00 =     812.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.23
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.693
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                 C        0.59      0.25      0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.59      SUBAREA RUNOFF(CFS) =    1.32
 EFFECTIVE AREA(ACRES) =      5.10   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =        5.1       PEAK FLOW RATE(CFS) =      12.15
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =         5.1  TC(MIN.) =     10.23
 EFFECTIVE AREA(ACRES) =      5.10  AREA-AVERAGED Fm(INCH/HR)=  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 0.187
 PEAK FLOW RATE(CFS)   =      12.15
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

APPENDIX C

SUPPORTING DOCUMENTS

Hydrologic Soil Group—Orange County and Part of Riverside County, California



Map Scale: 1:2,500 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Orange County and Part of Riverside County, California
Survey Area Data: Version 12, Sep 12, 2018

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

Date(s) aerial images were photographed: Jan 3, 2015—Jan 17, 2015

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
123	Bolsa silt loam, drained	C	9.3	57.8%
158	Hueneme fine sandy loam, drained	A	6.8	42.2%
Totals for Area of Interest			16.0	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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

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

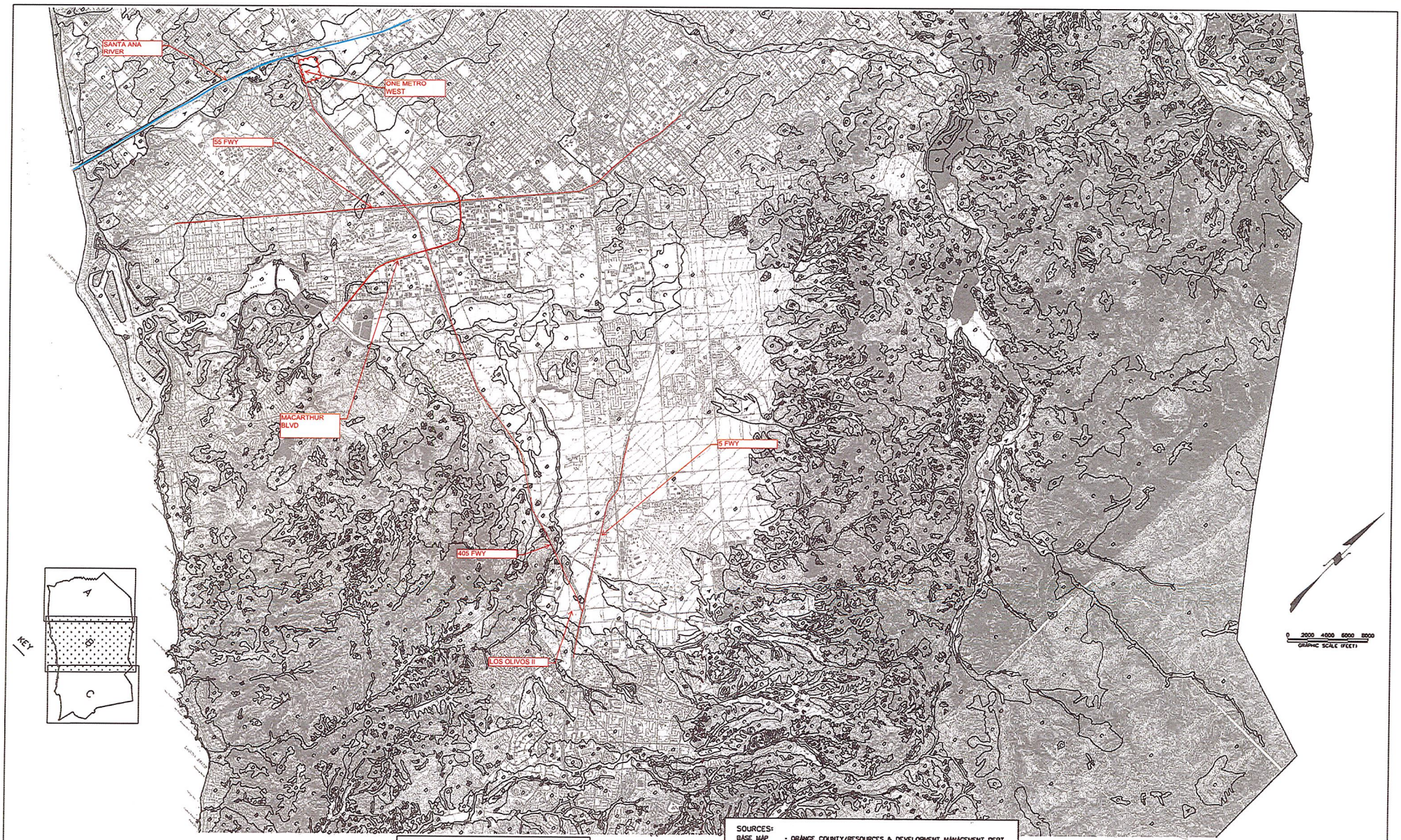
Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

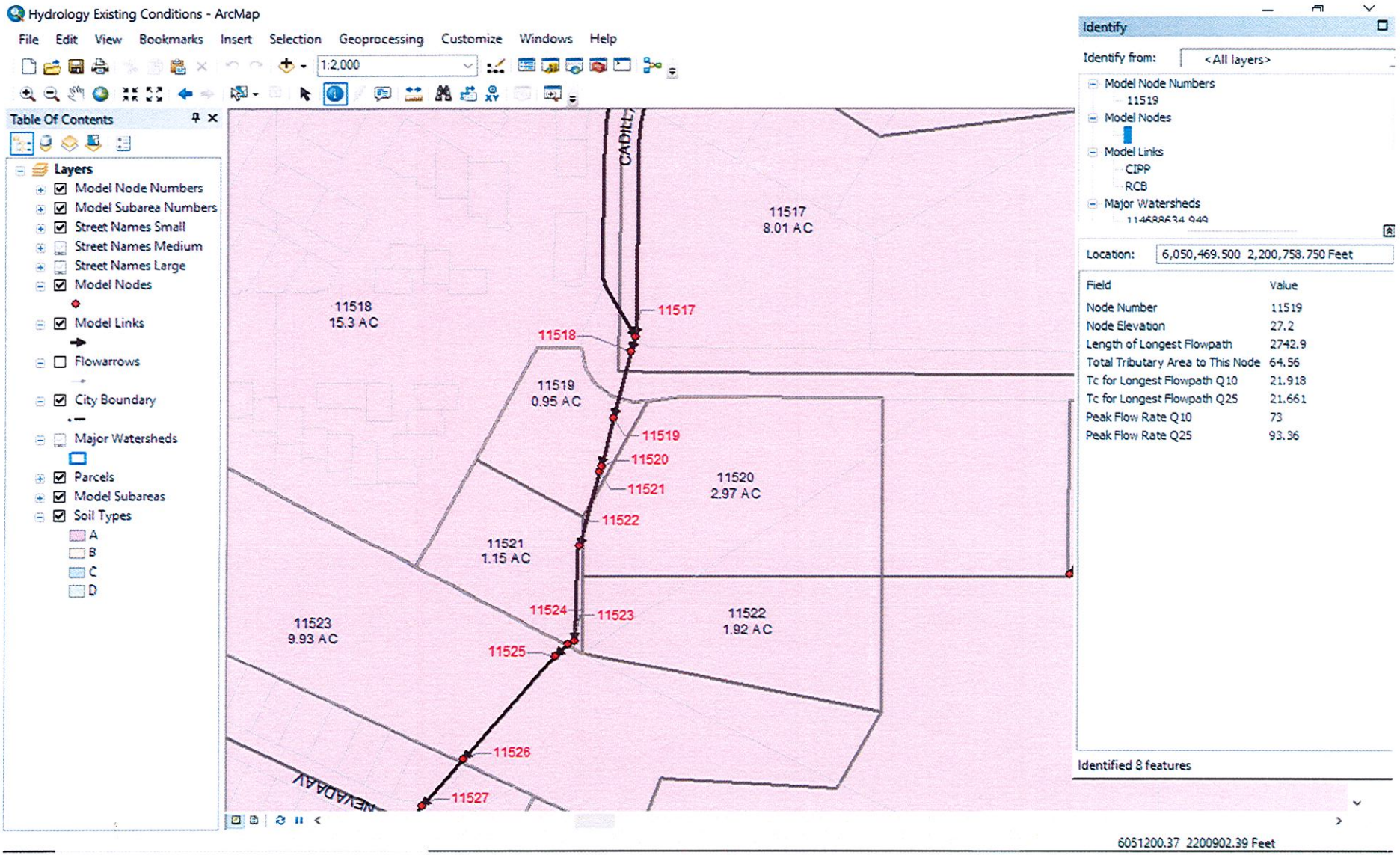


ORANGE COUNTY
HYDROLOGY MANUAL

LEGEND
A B C D HYDROLOGIC SOIL GROUPS
HYDROLOGIC SOIL GROUP BOUNDARY

SOURCES:
BASE MAP - ORANGE COUNTY/RESOURCES & DEVELOPMENT MANAGEMENT DEPT GEOMATICS AND LAND INFORMATION SYSTEMS DIVISION
SOIL GROUPS - SOIL SURVEY OF ORANGE COUNTY AND WESTERN PART OF RIVERSIDE COUNTY, CALIFORNIA, USDA SOIL CONSERVATION SERVICE, 1978.

HYDROLOGIC CLASSIFICATION OF SOILS
ORANGE COUNTY, CALIFORNIA
PLATE B


Hydrology Existing Conditions - ArcMap
File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
1:2,000
Table Of Contents
Layers
Model Node Numbers
Model Subarea Numbers
Street Names Small
Street Names Medium
Street Names Large
Model Nodes
Model Links
Flowarrows
City Boundary
Major Watersheds
Parcels
Model Subareas
Soil Types
A
B
C
D
CADILL
11517
8.01 AC
11518
15.3 AC
11519
0.95 AC
11520
2.97 AC
11521
1.15 AC
11522
1.92 AC
11523
9.93 AC
11517
11518
11519
11520
11521
11522
11523
11524
11525
11526
11527
NEVADA AV
Identify
Identify from:
<All layers>
Model Node Numbers
11519
Model Nodes
Model Links
CIPP
RCB
Major Watersheds
Location:
6,050,469.500 2,200,758.750 Feet
Field
Value
Node Number
11519
Node Elevation
27.2
Length of Longest Flowpath
2742.9
Total Tributary Area to This Node
64.56
Tc for Longest Flowpath Q10
21.918
Tc for Longest Flowpath Q25
21.661
Peak Flow Rate Q10
73
Peak Flow Rate Q25
93.36
Identified 8 features
6051200.37 2200902.39 Feet

PROJECT SITE

#11514

#11524

#11523

#11525

SSD? Need Data

#11525 (2006 SD Study Qty) NODE.

PSOMAS

City of Costa Mesa
Hydrology Exhibit

Storm Facilities
- City of Costa Mesa
- Caltrans
- Orange County
- Private
- Surface Flow
- Recommended New Facility
- Recommended Upgrade to Existing Facility

Structures
- Catchbasins & Inlets
- Manhole

Miscellaneous
- City Boundary
- Surface Flow Direction

B1

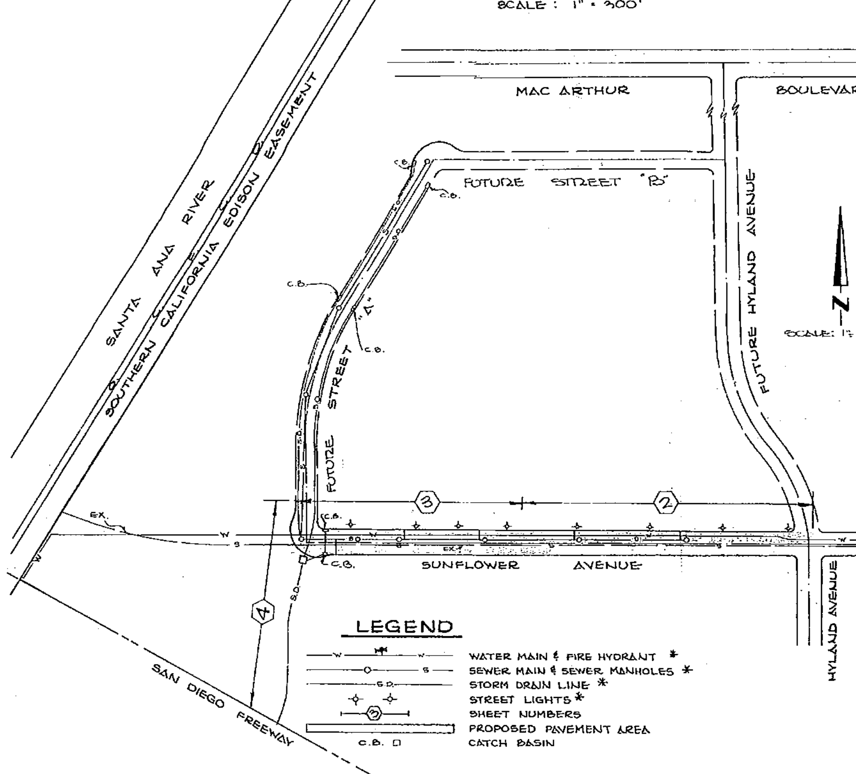
Plotted on Jun 12, 2006

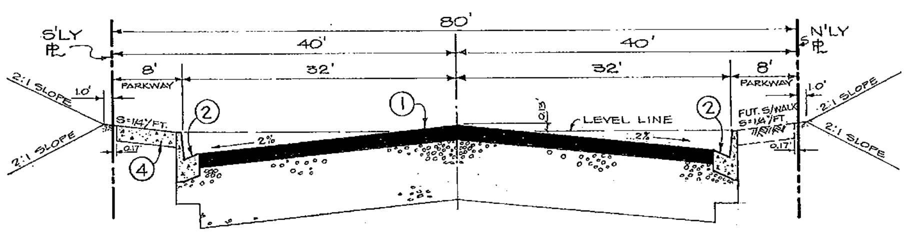
Table B.2
City of Costa Mesa MPD
Model Results for all Links

Upstream Node Number	Downstream Node Number	Length (ft)	Existing Dia / Ht. (ft)	Existing Width (ft)	Proposed Dia / Ht. (ft)	Proposed Width (ft)	Ultimate 10 yr Q (cfs) at Up node	Ultimate 25 yr Q (cfs) at Up node	Ultimate 10 yr Q (cfs) at Dn node	Ultimate 10 yr Q (cfs) at Dn node
11480	11481	1334.91	2.00	0.00	4.25	0.00	86.1	113.3	86.1	113.3
11481	11482	45.88	2.50	0.00	4.25	0.00	124.8	164.0	124.8	164.0
11482	11483	134.56	3.00	0.00	0.00	0.00	129.1	169.6	129.1	169.6
11483	11484	24.08	0.00	0.00	0.00	0.00	129.8	170.6	129.8	170.6
11484	11485	190.53	15.00	74.00	0.00	0.00	1227.3	1528.7	1227.3	1528.7
11485	11538	877.96	15.00	74.00	0.00	0.00	1227.3	1532.4	1227.3	1532.4
11500	11501	299.41	0.00	0.00	0.00	0.00	0.0	0.0	1.1	1.4
11501	11502	135.25	0.00	0.00	0.00	0.00	1.1	1.4	2.3	2.9
11502	11503	265.57	0.00	0.00	0.00	0.00	2.3	2.9	3.2	4.1
11503	11504	483.42	0.00	0.00	0.00	0.00	3.2	4.1	6.2	7.9
11504	11505	677.22	3.00	0.00	0.00	0.00	6.2	7.9	13.2	16.9
11505	11506	69.41	3.00	0.00	0.00	0.00	13.2	16.9	13.2	16.9
11506	11517	667.79	3.50	0.00	0.00	0.00	16.1	20.7	16.1	20.7
11510	11511	280.86	0.00	0.00	0.00	0.00	0.0	0.0	2.3	3.0
11511	11512	325.72	0.00	0.00	0.00	0.00	2.3	3.0	6.2	7.9
11512	11513	422.87	0.00	0.00	0.00	0.00	6.2	7.9	8.3	10.6
11513	11514	59.69	0.00	0.00	2.00	0.00	8.3	10.6	11.8	15.2
11514	11515	88.73	2.50	0.00	0.00	0.00	11.8	15.2	11.8	15.2
11515	11516	723.52	3.00	0.00	0.00	0.00	23.3	30.0	34.8	44.9
11516	11517	705.67	3.50	0.00	0.00	0.00	34.8	44.9	34.8	44.9
11517	11518	24.57	3.00	5.50	0.00	0.00	49.1	63.4	55.7	71.2
11518	11519	111.26	3.00	5.50	0.00	0.00	55.7	71.2	73.0	93.4
11519	11520	81.01	5.50	0.00	0.00	0.00	73.0	93.4	73.0	93.4
11520	11521	8.25	5.50	0.00	0.00	0.00	73.6	94.1	73.6	94.1
11521	11522	127.22	5.50	0.00	0.00	0.00	77.2	98.6	77.2	98.6
11522	11523	157.34	5.50	0.00	0.00	0.00	77.8	99.1	77.8	99.1
11523	11524	10.99	5.50	0.00	0.00	0.00	79.2	100.6	79.2	100.6
11524	11525	28.43	5.50	0.00	0.00	0.00	90.9	115.3	90.9	115.3
11525	11526	223.77	5.50	0.00	0.00	0.00	94.8	120.3	94.8	120.3
11526	11527	100.58	4.50	0.00	5.50	0.00	99.2	126.0	99.2	126.0
11527	11528	54.16	4.50	0.00	5.50	0.00	99.2	126.0	99.2	126.0
11528	11535	414.59	4.50	0.00	5.50	0.00	99.2	126.0	99.2	126.0
11530	11531	322.86	0.00	0.00	0.00	0.00	0.0	0.0	1.3	1.7
11531	11532	344.65	0.00	0.00	0.00	0.00	1.3	1.7	2.2	2.8
11532	11533	362.36	0.00	0.00	0.00	0.00	2.2	2.8	3.2	4.1
11533	11534	72.39	0.00	0.00	0.00	0.00	3.2	4.1	3.9	5.0
11534	11535	40.62	1.50	0.00	0.00	0.00	3.9	5.0	3.9	5.0
11535	11536	32.00	5.50	0.00	0.00	0.00	103.6	133.0	103.6	133.0
11536	11537	152.23	5.50	0.00	0.00	0.00	103.6	133.0	103.6	133.0
11537	11538	13.91	0.00	0.00	0.00	0.00	103.6	133.0	103.6	133.0
11538	11539	444.93	15.00	74.00	0.00	0.00	1232.0	1532.4	1232.0	1532.4
11539	11559	110.96	10.00	36.00	0.00	0.00	1232.0	1532.4	1232.0	1532.4
11540	11541	81.48	0.00	0.00	0.00	0.00	0.0	0.0	0.7	0.9
11541	11542	64.13	2.00	0.00	0.00	0.00	0.7	0.9	0.7	0.9
11542	11543	37.55	2.50	0.00	0.00	0.00	2.8	3.6	2.8	3.6
11543	11559	30.69	0.00	0.00	0.00	0.00	2.8	3.6	2.8	3.6
11550	11551	298.96	0.00	0.00	0.00	0.00	0.0	0.0	2.6	3.4
11551	11552	240.00	0.00	0.00	0.00	0.00	2.6	3.4	3.6	4.6
11552	11553	229.99	0.00	0.00	0.00	0.00	3.6	4.6	4.3	5.5
11553	11554	121.61	0.00	0.00	0.00	0.00	4.3	5.5	7.8	10.0

VICINITY MAP

SCALE: 1" = 300'



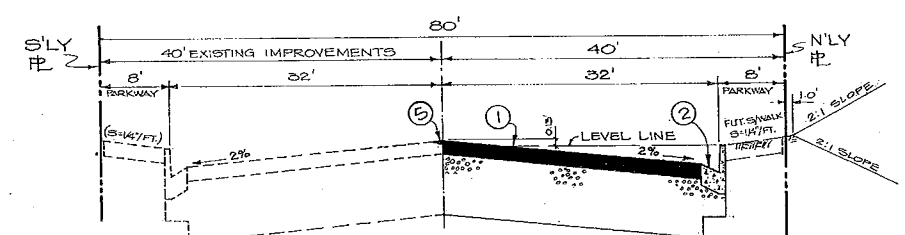


TYPICAL CROSS SECTION

SUNFLOWER AVENUE

(STA. 25+57.34 TO E.C. & END CONST.)

SCALE: VERT. 1"=2'
HORIZ. 1"=10'



TYPICAL CROSS SECTION

SUNFLOWER AVENUE

(STA. 16+51.54 TO STA. 25+57.34)

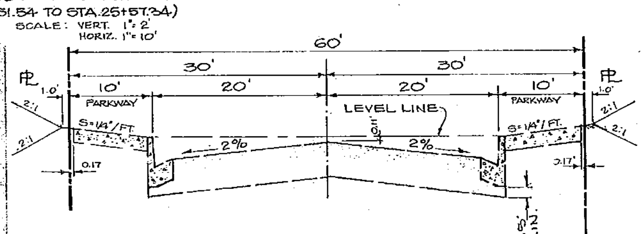
SCALE: VERT. 1"=2'
HORIZ. 1"=10'

NOTICE TO CONTRACTORS

All contractors and subcontractors performing work shown on or related to these plans shall conduct their operations so that all employees are provided a safe place to work and the public is protected. All contractors and subcontractors shall comply with the "Occupational Safety and Health Regulation" of the U.S. Department of Labor, and with the State of California Department of Industrial Relations' "Construction Safety Orders."

The civil engineer shall not be responsible in any way for the contractors' and subcontractors' compliance with the "Occupational Safety and Health Regulations" of the U.S. Department of Labor or with the State of California Department of Industrial Relations' "Construction Safety Orders."

Contractor further agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the contractor shall defend, indemnify and hold the owner and the engineer harmless from any and all liability, real or alleged, in connection with the performance of work on this project, excepting for liability arising from the sole negligence of the owner or the engineer.



TYPICAL CROSS SECTION

FUTURE STREETS "A" & "B" SCALE: VERT. 1"=2' HORIZ. 1"=10'

ESTIMATE OF QUANTITIES

NOTE: QUANTITIES SHOWN ARE TO BE USED SOLELY FOR THE PURPOSE OF COMPARISON OF BIDS. THE CONTRACTORS COMPENSATION WILL BE COMPUTED UPON ACTUAL QUANTITIES IN THE COMPLETED WORK, WHETHER THEY BE MORE OR LESS THAN THOSE SHOWN HEREON. THE FINAL QUANTITIES SHALL BE DETERMINED BY THE ENGINEER.

CONSTRUCTION NOTES — QUANTITIES

STREET

No.	Construction Notes	Quantities	
★ 1	CONST. .035' A.C. OVER .138' A.B. W/ MC 70 PRIME COAT.	83,568	S.F.
2	CONST. TYPE "C-8" CURB AND GUTTER PER STD. NO. 302	2,653	L.F.
3	CONST. DRIVEWAY APPROACH, TYPE II, PER STD. NO. 504	630	S.F.
4	CONST. CONC. SIDEWALK PER STD. NO. 402	6,120	S.F.
5	JOIN EXIST. PAVEMENT & FEATHER TO PROVIDE SMOOTH SURFACE	1,978	S.F.
6	CONST. WHEELCHAIR ACCESS RAMP PER STD. NO. 506	72	S.F.
7	CONST. STREET LIGHT TYPE "B-1" PER STD. NO. 701; 20,000 L.M.V.	9	EA.
8	RELOCATE POWER POLE (BY OTHERS).	4	EA.
9	REMOVE STREET BARRICADE & SALVAGE FOR RE-USE HEREIN	29	L.F.
10	REMOVE GUIDE MARKER.	8	EA.
11	REMOVE REDWOOD HEADER & SALVAGE FOR RE-USE.	989	L.F.
12	REMOVE OR CRUSH EXIST. IRRIG. LINE IN PLACE.	80	L.F.
13	CONST. PARKWAY CULVERT PER DETAIL "H" ON SHEET Nº 3	24	L.F.
14	CONST CURB-RETURN DRIVEWAY PER DETAIL "A" ON SHEET Nº 5.	654	S.F.
	W/ 8" C.F. TO 6" C.F. TRANSITION CURB RETURN	79	L.F.
15	INSTALL STREET BARRICADE PER STD. Nº 601	66	L.F.
16	INSTALL 2"X6" REDWOOD HEADER.	62	L.F.
△1 17	CONST. 3" C.I. SUMP PUMP DRAIN THRU CURB SIMILAR TO DETAIL "H" ON SHEET NO. 3	10	L.F.
	EXCAVATION = 8000 C.Y.		

★ SEE GENERAL NOTE Nº 38

SEWER

No.	Construction Notes	Quantities	
21	CONST. STD. SEWER MANHOLE PER COSTA MESA SANITARY DISTRICT SPECIFICATIONS.	5	EA.
22	CONST. DROP MANHOLE PER COSTA MESA SANITARY DISTRICT SPECIFICATIONS.	1	EA.
23	CONST. 72" I.D. SEWER MANHOLE PER ORANGE COUNTY SANITATION DISTRICT Nº 1 SPECIFICATIONS	1	EA.
24	CONST. 6" V.C.P. LATERAL	108	L.F.
25	CONST. 8" V.C.P. SEWER MAIN	1,038	L.F.
26	CONST. STEEL SEWER ENCASEMENT PER DETAIL "B" ON SHEET Nº 5.	LUMP SUM	
27	CONST 12" V.C.P. SEWER MAIN	499	L.F.
28	ADJUST EXIST. SEWER MANHOLE TO GRADE.	1	EA.
29	REMOVE EXIST. 39" R.C.P. SEWER & PLUG OPEN END WITH DOUBLE ROW OF BRICK & MORTAR	LUMP SUM	

STORM DRAIN

No.	Construction Notes	Quantities	
31	CONST. CATCH BASIN NO. 3 PER L.A.C.F.C.D. STD. 2-D163, WITH LOCAL DEPRESSION (H=1") PER L.A.C.F.C.D. STD. 2-D415 W/ HORIZ. BARS PER STD. 2D175	2	EA.
32	CONST. JUNCTION STRUCTURE PER DETAIL "G" SHT. Nº 5.	1	EA.
33	CONST. JUNCTION CHAMBER PER DETAIL J, SHT. Nº 5.	1	EA.
34	CONST. A.C.P. STUB CONNECTION. PER DETAIL "D" SHT. Nº 5	4	EA.
35	CONST. 36" R.C.P. (1500 D)	38	L.F.
36	CONST. 42" R.C.P. (1500 D)	37	L.F.
37	CONST. 66" C.I.P.P. PER DETAIL "E", SHT. Nº 5.	385	L.F.
38	CONST. 36" C.I.P.P. PER DETAIL "E", SHT. No. 5 OR 30" R.C.P. (1500 D).	56	L.F.
39	CONST. 3' HIGH BY 5'-6" WIDE BOX CULVERT WITH "V" INVERT PER STATE DIVISION OF HIGHWAYS STD. PLAN Nº D80-1, USING SPECS FOR 3'X6' BOX, CLASS A	118	L.F.
40	RELOCATE DROP INLET PER DETAIL "F", SHT. Nº 5.	LUMP SUM	
41	CONST. JUNCTION STRUCTURE PER DETAIL "H", SHT. Nº 5.	1	EA.

GENERAL NOTES

1. ALL STREET WORK SHALL CONFORM TO THE STANDARDS SPECIFICATIONS OF THE STATE OF CALIFORNIA, DIVISION OF HIGHWAYS, DATED JANUARY 1973, AND THE CITY OF COSTA MESA STANDARDS AND SHALL MEET THE APPROVAL OF THE CITY ENGINEER.
2. ALL STREET STATIONING REFERS TO THE CENTERLINE OF THE STREET.
3. CURB DATA REFERS TO THE FACE OF CURB.
4. CONTRACTOR SHALL OBTAIN A PERMIT AND REQUEST INSPECTION FROM CITY ENGINEERING DEPARTMENT AT LEAST 48 HOURS IN ADVANCE OF PERFORMING ANY WORK. TELEPHONE: 556-5323.
5. THE CITY OF COSTA MESA WILL PAY FOR THE INITIAL SOIL AND MATERIAL TE[STS.] ANY SUBSEQUENT SOIL AND MATERIALS TESTS DEEMED NECESSARY, DUE [TO] THE FAILURE OF THE INITIAL TEST, WILL BE AT THE CONTRACTOR'S EXPENSE.
6. ALL UNDERGROUND WORK SHALL BE COMPLETED PRIOR TO ANY SURFACE W[ORK] IN THE PUBLIC RIGHT OF WAY.
7. THE CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES IN PLACE.
8. WHERE DRIVEWAY DEPRESSIONS ARE CONSTRUCTED, THE DRIVEWAY APPROAC[H] SHALL BE CONSTRUCTED TO PROPERTY LINE PER CITY OF COSTA MESA ST[D.] PLANS. DRIVEWAY LOCATIONS, TYPE, AND WIDTH MUST BE APPROVED BY CITY ENGINEER.
9. THE AMOUNT OF ASPHALT BINDER TO BE MIXED WITH THE MINERAL AGGREGATE SH[ALL] BE 5.6±% BY DRY WEIGHT. THE EXACT AMOUNT WILL BE DETERMINED BY THE C[ITY] ENGINEER. SAMPLES OF THE PROPOSED AGGREGATE SHALL BE SUBMITTED [TO] THE CITY ENGINEER FOR TESTING IN ORDER THAT THE PERCENT BINDER BE DETERMINED FOUR (4) DAYS IN ADVANCE OF CONSTRUCTION.
10. PARKWAY TREES WILL BE PLANTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE CITY OF COSTA MESA PARK SUPERINTENDENT.
11. STREET LIGHTS TO BE INSTALLED PER CITY OF COSTA MESA STD. DWG. Nº 701 FINAL LOCATIONS SUBJECT TO CITY ENGINEER'S APPROVAL.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND MAINTAINING WAR[N]ING SIGNS, DEVICES, LIGHTS AND FLAGMEN IN ACCORDANCE WITH THE STATE OF CALIFORNIA, DEPT. OF PUBLIC WORKS "MANUAL OF WARNING SIGNS, LIG[HTS] AND DEVICES FOR USE IN PERFORMANCE OF WORK UPON HIGHWAYS".
13. THE SEWER SYSTEM SHALL CONFORM TO THE STD.'S OF THE COSTA MESA SANITARY DISTRICT
14. ALL SEWER STATIONING IS ALONG THE CENTERLINE OF THE SEWER.
15. SEWER CONTRACTOR SHALL HAVE A COPY OF THE COSTA MESA SANITATION DISTRICT SPECIFICATIONS AT JOB SITE.
16. THE DEVELOPER SHALL FURNISH THE SEWER CONTRACTOR WITH A PLOT P[LAN] INDICATING THE RECOMMENDED LOCATION OF THE HOUSE CONNECTION FOR EA[CH] LOT PRIOR TO SEWER MAIN CONSTRUCTION.
17. ALL SEWER LATERALS SHALL BE STAKED BY A SURVEYOR BEFORE TRENCHIN[G].
18. ALL SEWER HOUSE CONNECTIONS SHALL BE PLACED PRIOR TO SURFACING STREETS.
19. CLAY PIPE JOINT COMPOUND SHALL BE CPI-2, JC-60 MECHANICAL COMPRESSI[ON] JOINTS SHALL BE WEDGE-LOCK SPEED SEAL MAINLINE OR APPROVED EQU[AL]. IN NO CASE WILL JOINT MATERIAL USING NEAT PORTLAND CEMENT MORT[AR] OR GROUT BE PERMITTED.
20. STAMP "S" ON CURB AT ALL SEWER LATERAL LOCATIONS
21. CONTRACTOR SHALL REQUEST INSPECTION FROM THE OFFICE OF THE SANITARY DISTRICT ENGINEER 24 HOURS PRIOR TO COMMENCMENT OF WORK. TEL:
22. MANHOLES SHALL BE BRICK OR PRECAST CONCRETE AS MANUFACTURED [BY] ASSOCIATED CONCRETE PRODUCTS INC. OR APPROVED EQUAL.
23. SEWER MANHOLE FRAMES AND COVERS SHALL BE LEFT 6" BELOW FINISHE[D] GRADE. THE SEWER CONTRACTOR SHALL RAISE THE MANHOLE FRAMES A[ND] COVERS TO FINISHED GRADE AFTER STREET SURFACING IS COMPLETED.
24. SEWER MANHOLES & COVERS SHALL BE ALHAMBRA FOUNDRY A-1270 OR APPROVED EQUAL
25. 6" V.C.P. LATERALS SHALL BE CONSTRUCTED FROM THE SEWER MAIN TO THE PROPE[RTY] LINE.
26. PERMITS REQUIRED SHALL BE OBTAINED FROM THE STREET DEPARTMENT, 7[7] FAIR DRIVE, COSTA MESA.
27. STREET NAME SIGNS TO BE INSTALLED BACK OF CURB OR ON BRACKET MOUNTED ON STREET LIGHT POLE, PER CITY OF COSTA MESA STANDARD DWG. Nº 606.
28. ANY CITY BENCH, MONUMENT, OR TIES THAT ARE DESTROYED OR DISTURBED [DUR]ING CONSTRUCTION SHALL BE REPLACED. ANY CHANGES IN LOCATION OR ELE[VAT]ION SHALL BE REPORTED TO THE CITY ENGINEER BY A LICENSED SURVEY[OR] ON 8 1/2 X 11 LOOSE LEAF PAPER (ONE SIDE ONLY) SHOWING LOCATION A[ND] TIES, OR LEVEL RUN.
29. ALL STORM DRAIN WORK SHALL CONFORM TO THE L.A.C.F.C.D. STANDARD PLA[NS] AND SHALL MEET WITH THE APPROVAL OF THE CITY ENGINEER.
30. DEVELOPER OR HIS AGENT WILL FURNISH SIGNED PLANS TO ALL UTILITY AGENCI[ES].
31. CONTRACTOR SHALL NOTIFY ALL UTILITY AGENCIES CONCERNED 48 HOURS PRIOR T[O] START OF CONSTRUCTION.
32. ALL EXISTING STREET INTERSECTIONS ARE TO BE OPEN FOR TRAFFIC AT THE [END] OF EACH WORKING DAY.
33. ALL STORM DRAIN STATIONING IS ALONG CENTERLINE OF THE STORM DRAI[N].
34. ALL CATCH BASINS ARE TO HAVE HORIZONTAL PROTECTION BARS PER L.A.C.F.[C.D.] STANDARD PLAN 2-D-175.
35. ALL CATCH BASINS ARE TO HAVE LOCAL DEPRESSION PER L.A.C.F.C.D. STAN[D]ARD PLAN 2D-145.
36. PIPE BEDDING IN TRENCHES SHALL BE PER L.A.C.F.C.D. STANDARD PLAN 2D-177, CASE III, EXCEPT AS SHOWN. BEDDING MATERIAL SHALL HA[VE] A MINIMUM SAND EQUIVALENT OF 30.
37. CAST IN PLACE PIPE MUST CONFORM TO THE L.A.C.F.C.D. SPECIFICATIONS EN[TI]TLED "DESIGN CRITERIA & SPECIFICATIONS FOR CAST IN PLACE NON-REINFO[RCED] CONCRETE PIPE" DATED JULY 1967 (REVISED AUG. 1968) WITH THE FOLLOWIN[G] ADDED SPECIFICATIONS.
    (A.) MIN. WALL THICKNESS SHALL BE AS SPECIFIED IN SEC. 63 OF THE STATE O[F] CALIF. DIV. OF HIGHWAYS STANDARD SPECIFICATIONS.
    (B) ALL TESTS OTHER THAN LOAD BEARING TEST SHALL BE PERFORMED PER L.A.C.F.C.D. SPECS. MENTIONED ABOVE. THE LOAD BEARING TEST SHALL [BE] PERFORMED AS REQ'D. & DIRECTED BY THE CITY ENGINEER.
    (C.) THE ENTIRE COST OF THE REQ'D TESTS SHALL BE BORNE BY THE CONTRA[CTOR].
38. PAVEMENT THICKNESS AS SHOWN, IS BASED ON ASSUMED "R" VALUE OF 5. DURING CONSTRUCTION A SOILS TEST SHALL BE MADE TO DETERMINE THE ACTUAL "R" VALUE A[ND] PAVEMENT THICKNESS ADJUSTED ACCORDINGLY. TESTS SHALL BE MADE BY A LICENSED SOI[LS] ENGINEER.

APPROVED Ed Schnabel 4-8-75
COSTA MESA COUNTY WATER DISTRICT - MANAGER OF OPERATIONS DA[TE]

APPROVED Donald E. Stevens 4-18-75
COSTA MESA SANITARY DISTRICT DATE

APPROVED [signature] RCE 20366 10 Apr 75
ORANGE COUNTY SANITATION DISTRICT Nº 7 DATE

"AS BUILT"

NOTICE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. APPROVAL OF THIS PLAN BY THE CITY OF COSTA MESA DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OR COMPLETENESS OF THE LOCATION OR THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THE CONTRACTOR IS REQUIRED TO TAKE ALL DUE PRECAUTIONARY MEANS TO PROTECT THE UTILITY LINES NOT OF RECORD OR NOT SHOWN ON THIS PLAN.

STATE OF CALIFORNIA ENCROACHMENT PERMIT Nº 775-E-778568-BD

THESE PLANS WERE PREPARED UNDER THE SUPERVISION OF:
Dale K. Price 12-4-74
DALE K. PRICE R.C.E. 24004 DATE

WILLIAMSON and SCHMI[D]
17782 SKY PARK BOULEVARD • IRVINE, CALIFORNIA 92707 • (714) 549-

REVISIONS

NO.	DATE	DESCRIPTION	APP.
1	4-30	Added 3" C.I. Drain Thru Curb - Item Nº 17	EB
△2	6-10	REVISED SHEETS 3 & 5 TO REFLECT AS-BUILT SEWERS.	D.K.P.
△3	9-23-76	ADDITIONAL REINFORCING ON DETAIL G, SHT. 5	M.S.
4	9-23-76	"AS BUILT"	M.S.

CONTRACTOR: M.G.R. CONSTRUCTION
PERMITS: 039, 040, 345, & 420
WORK STARTED: MAY 12, 1975.
WORK ACCEPTED: DEC. 5, 1975.
INSPECTED BY: D.B. BULLARD SEPT. 22, 1976 DATE

REFERENCES

FIELD BOOK	PAGE		
		BENCH MARK NO. 145	REFERENCE PLANS: ZE 73-07
		ELEVATION 30.590	NOTE TO CONTRACTOR, SEE SHT. 1, 3 & 5
		DESCRIPTION: CHISLED △	STANDARD DRAWING NO. CITY OF COSTA MESA
		AT CENTER OF CURB	STD. PLAN Nº'S: 302, 402, 504, 601 & 701
		RETURN AT INT. OF HARBOR	
		BLVD. AND SUNFLOWER	
		AVENUE.	

	DATE		DATE
DESIGNED BY: J.E.B. & M.D.	11-74	CHECKED BY:	
DRAWN BY: E.B. & J.C.	11-74	CHECKED BY:	
RECOMMENDED BY: Ronald L. Loehr, ASSISTANT CITY ENGINEER	4-21-75	RIGHT OF WAY ACQUIRED:	
		RIGHT OF WAY AGENT	
APPROVED BY: James H. Eldridge, CITY ENGINEER	4/21/75		

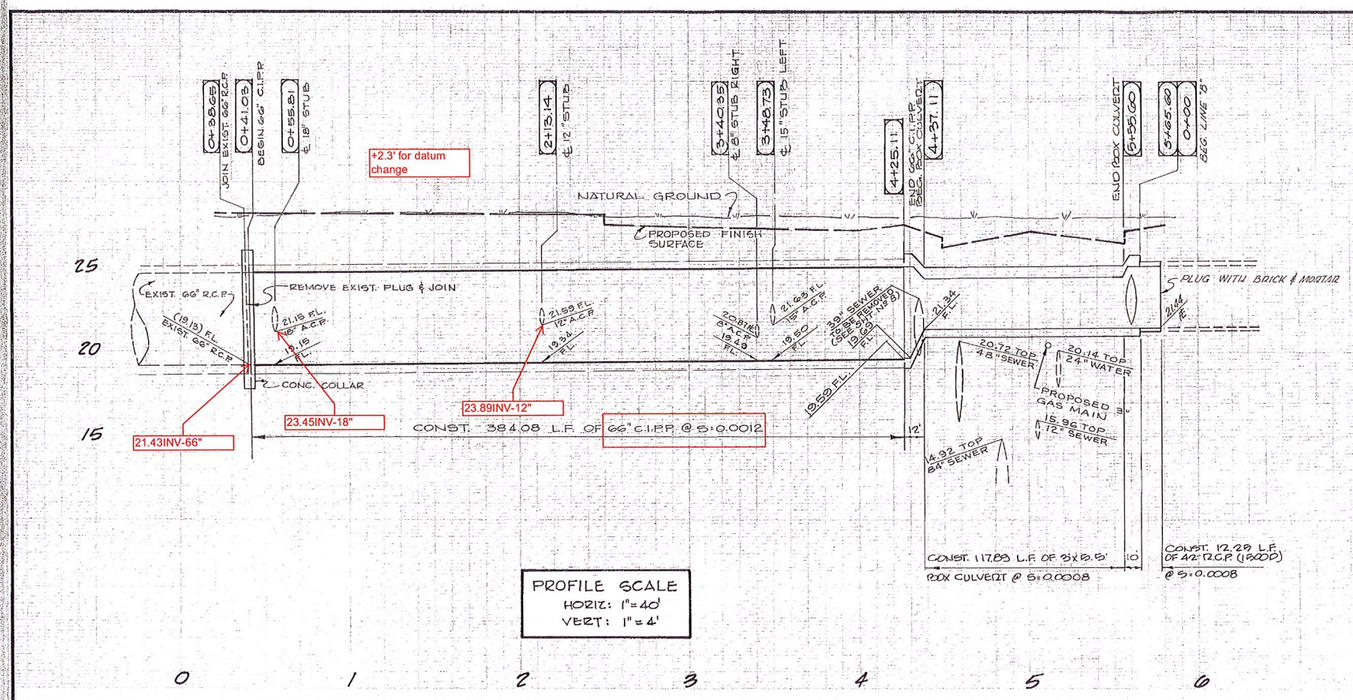
S75-07

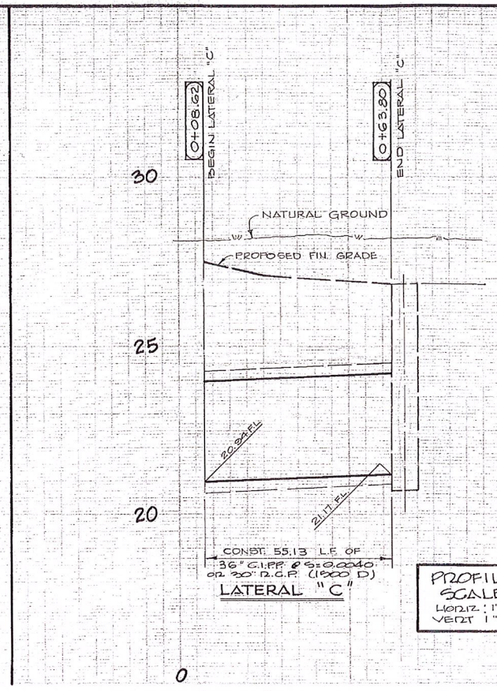
TITLE SHEET
IMPROVEMENT PLANS FOR
SUNFLOWER AVENUE
FROM HYLAND AVENUE TO PROPOSED STREET "A"

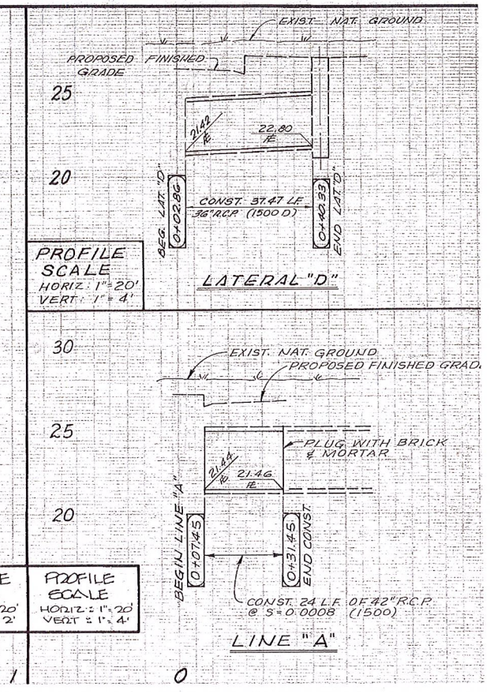
CITY OF COSTA MESA
DEPARTMENT OF ENGINEERING SERVICES

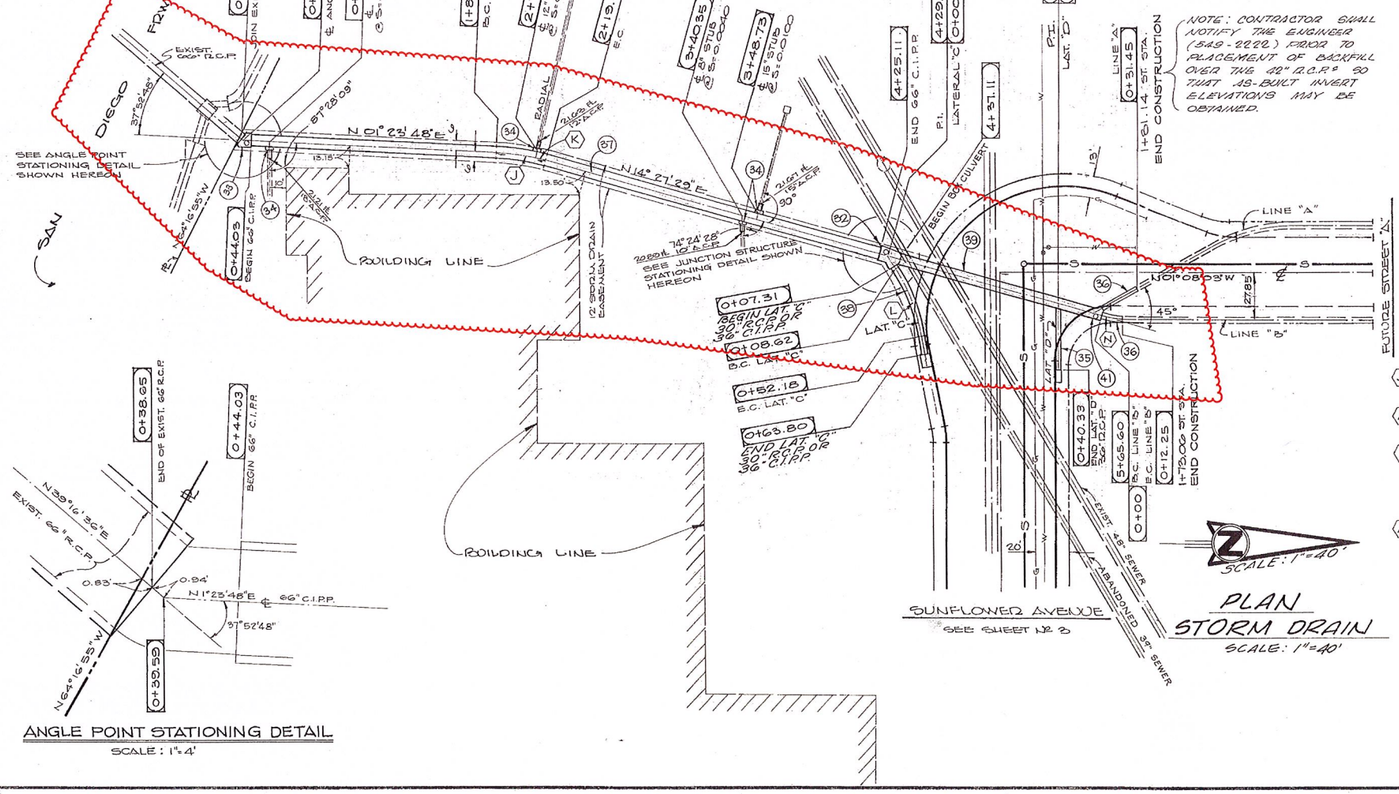
SHEET 1 OF
PLAN NUMBER

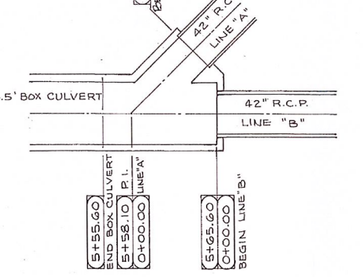
75-8 1 Job Nº 7

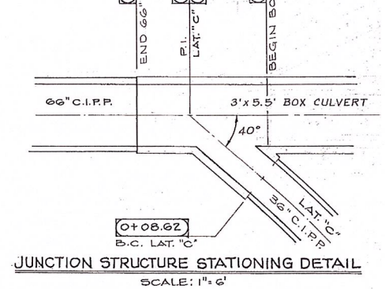












STORM DRAIN & CURVE DATA

- (J)- Δ=13°03'41" L=30.09' R=132.00' T=15.11
- (K)- Δ=2°40'39" L=6.17' R=132.00' T=3.08'
- (L)- Δ=24°57'36" L=43.56' R=100.00' T=22.13'
- (N)- Δ=15°35'32" L=12.25' R=45.00 T=6.16'

CONSTRUCTION NOTES

(20) CONST. JUNCTION STRUCTURE PER DETAIL "G" SHEET Nº 5.
(20B) CONST JUNCTION CHAMBER PER DETAIL "J" SHEET Nº 5.
(24) CONST. A.C.P. STUB CONNECTION PER DETAIL "D" SHT. Nº 5.
(24) CONST. 36" R.C.P. (1500 D).
(24) CONST 42" R.C.P. (1500 D).
(27) CONST. 66" C.I.P.P. OR 60" R.C.P. (1000D)
(38) CONST. 36" C.I.P.P. PER DETAIL "E" SHEET Nº 5, OR 30" R.C.P. (1500D)
(39) CONST. 3' HIGH BY 5'-6" WIDE BOX CULVERT WITH "V" INVERT PER STATE DIVISION OF HIGHWAYS STD. PLAN Nº D80-1, USING SPECS. FOR 3'X6' BOX, CLASS A.
(41) CONST. JUNCTION STRUCTURE PER DETAIL "H", SHEET Nº 5.

PLAN AND PROFILE
STORM DRAIN

375-07

4 SHEET OF

PLAN NUMBER

CITY OF COSTA MESA
DEPARTMENT OF ENGINEERING SERVICES

75-A 1 Job Nº 74

ACIM-405-2(850)104 E

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	405	18.3/27.4	1	19

INDEX OF SHEETS

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ON

STATE HIGHWAY

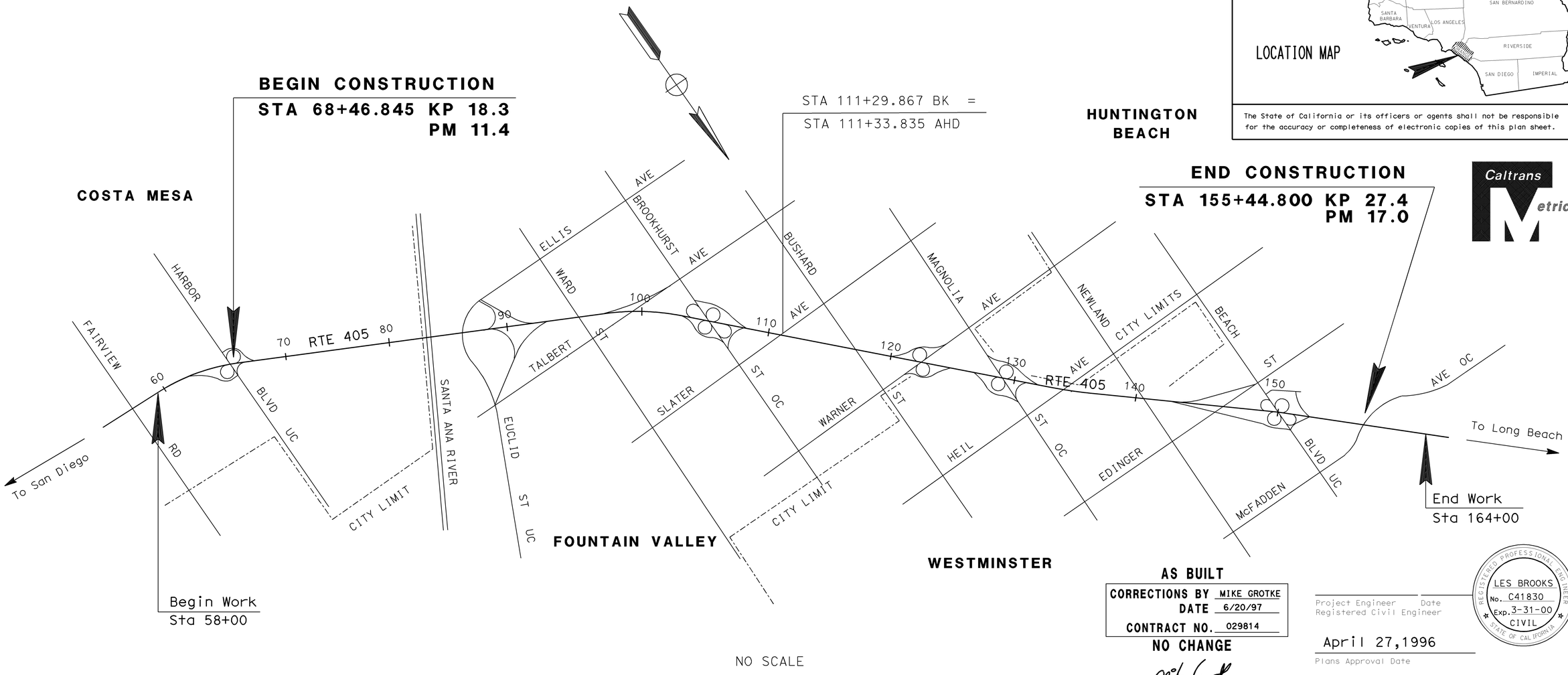
IN ORANGE COUNTY
IN COSTA MESA, FOUNTAIN VALLEY, WESTMINSTER AND HUNTINGTON BEACH
FROM HARBOR BOULEVARD UNDERCROSSING TO McFADDEN AVENUE OVERCROSSING

To be supplemented by Standard Plans dated July, 1995

LOCATION MAP

Caltrans

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



NO SCALE

AS BUILT
CORRECTIONS BY MIKE GROTKE
DATE 6/20/97
CONTRACT NO. 029814
NO CHANGE

Project Engineer Date
Registered Civil Engineer

April 27,1996
Plans Approval Date

REGISTERED PROFESSIONAL ENGINEER
LES BROOKS
No. C41830
Exp. 3-31-00
CIVIL
STATE OF CALIFORNIA

The Contractor shall possess the Class (or Classes) of license as specified in the ''Notice to Contractors''.

Contract No. 12-029814

PROJECT ENGINEER	DATE	PROJECT MANAGER	DATE
LES BROOKS	3-13-96	A ANGELINI	3-13-96

LAST REVISION 03-19-96

DATE PLOTTED => 01-JUN-2005
TIME PLOTTED => 15:12

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	405	18.3/27.4	6	19

Caltrans Metric

AS BUILT

CORRECTIONS BY MIKE GROTKE
DATE 6/20/97
CONTRACT NO. 029814

NO CHANGE

REGISTERED CIVIL ENGINEER

4-22-96
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — LES BROOKS No. C41830 Exp. 3-31-00 CIVIL — STATE OF CALIFORNIA

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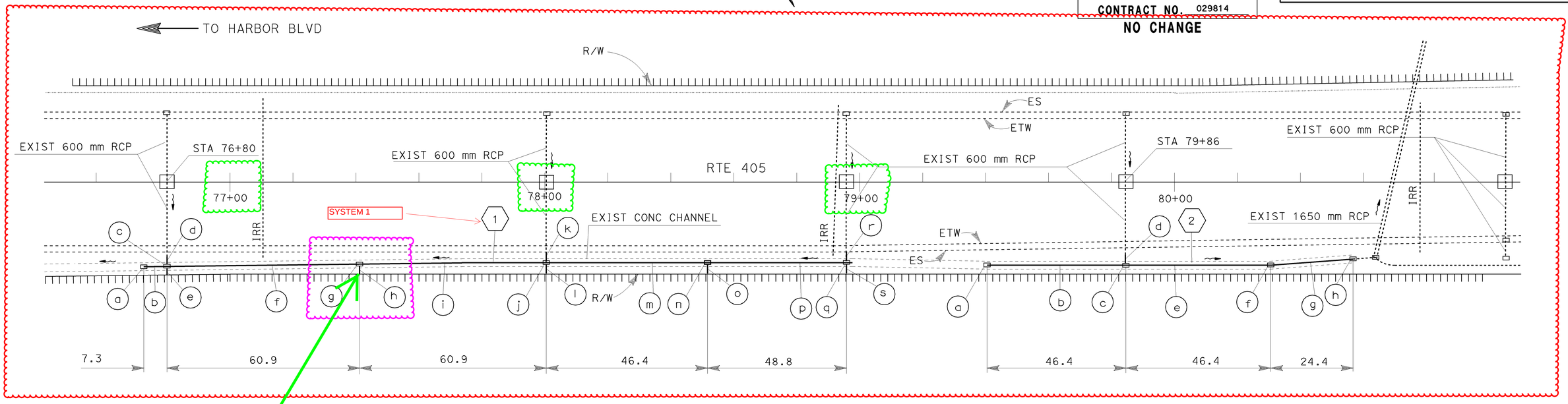
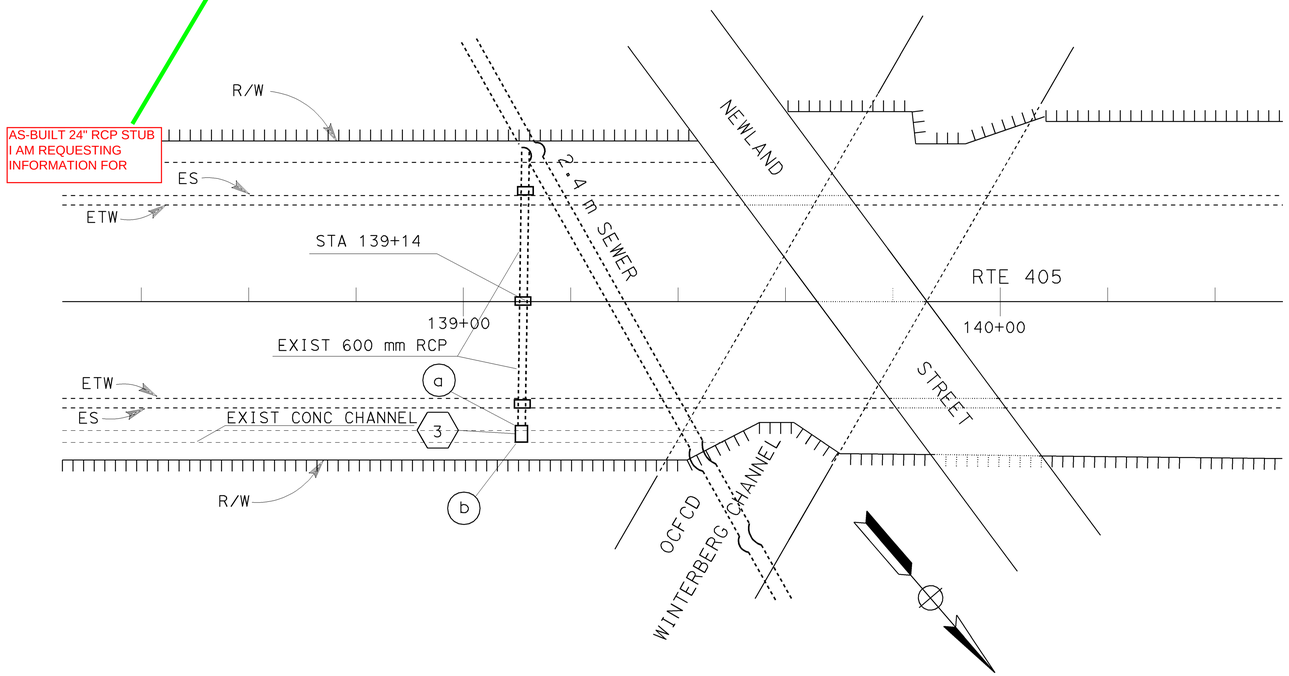




NOTE: UNLESS DENOTED OTHERWISE, ALL DIMENSIONS FOR MEASUREMENT OF LENGTH SHOWN ON THIS PLAN ARE IN METERS.

DRAINAGE PLAN

NO SCALE

D-1

DATE	REVISED BY	DATE REVISED
CALCULATED/ DESIGNED BY	CHECKED BY	

PROJECT ENGINEER
LES BROOKS

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
OFFICE OF DESIGN

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => tcpafras
DGN FILE => c02981i01.dgn

CU 12550

EA 029811

DATE PLOTTED => 01-JUN-2005
TIME PLOTTED => 15:13

LAST REVISION 03-19-96

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	405	18.3/27.4	8	19

REGISTERED CIVIL ENGINEER

4-22-96
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — LES BROOKS — No. C41830 — Exp. 3-31-00 — CIVIL — STATE OF CALIFORNIA

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

AS BUILT

CORRECTIONS BY MIKE GROTKE
DATE 6/20/97
CONTRACT NO. 029814
NO CHANGE

Mike Grotke

DRAINAGE QUANTITIES

DRAINAGE		STATION	MINOR CONC (MINOR STRUCTURE)	FRAME & GRATE (TYPE 600-12)	600 mm RCP	HEIGHT OF INLET	MAXIMUM COVER	
SYSTEM NO	UNIT		m3	EA	m	m	m	DESCRIPTION
1	a	76+75	1.4					PCC HEAD WALL, L=3 m; H=1.2 m
	b				7.3		1.2	600 mm RCP
	c	76+80	1.7	1		1.8		G-2 INLET
	d		0.4		2.0		1.2	600 mm RCP & PCC CONN
	e				2.0		1.2	600 mm RCP
	f				60.9		1.2	600 mm RCP
	g	77+46	1.7	1		1.8		G-2 INLET
	h				2.0		1.2	600 mm RCP
	i				60.9		1.2	600 mm RCP
	j	78+03	1.7	1		1.8		G-2 INLET
	k		0.4		2.0		1.2	600 mm RCP & PCC CONN
	l				2.0		1.2	600 mm RCP
	m				46.4		1.2	600 mm RCP
	n	78+49	1.7	1		1.8		G-2 INLET
	o				2.0		1.2	600 mm RCP
	p				47.8		1.2	600 mm RCP
	q	78+94	1.7	1		1.8		G-2 INLET
	r		0.4		2.0		1.2	600 mm RCP & PCC CONN
	s				2.0		1.2	600 mm RCP
2	a	79+40	0.9	1		0.9		G-2 INLET
	b				46.4		0.3	600 mm RCP
	c	79+86	0.9	1		0.9		G-2 INLET
	d		0.4		2.0		0.3	600 mm RCP & PCC CONN
	e				46.4		0.3	600 mm RCP
	f	80+31	0.9	1		0.9		G-2 INLET
	g				25.0		0.3	600 mm RCP
	h	80+50	0.4					PCC CONNECTION
3	a	138+99	0.4					PCC CONNECTION, S OF NEWLAND
	b				4.9		0.3	600 mm RCP
		TOTALS	15	8	364			

DRAINAGE QUANTITIES

D-3

DATE REVISED | REVISED BY | DATE | CALCULATED/ DESIGNED BY | CHECKED BY

PROJECT ENGINEER: LES BROOKS

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
OFFICE OF DESIGN

LAST REVISION DATE PLOTTED => 01-JUN-2005
03-19-96 TIME PLOTTED => 15:13

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

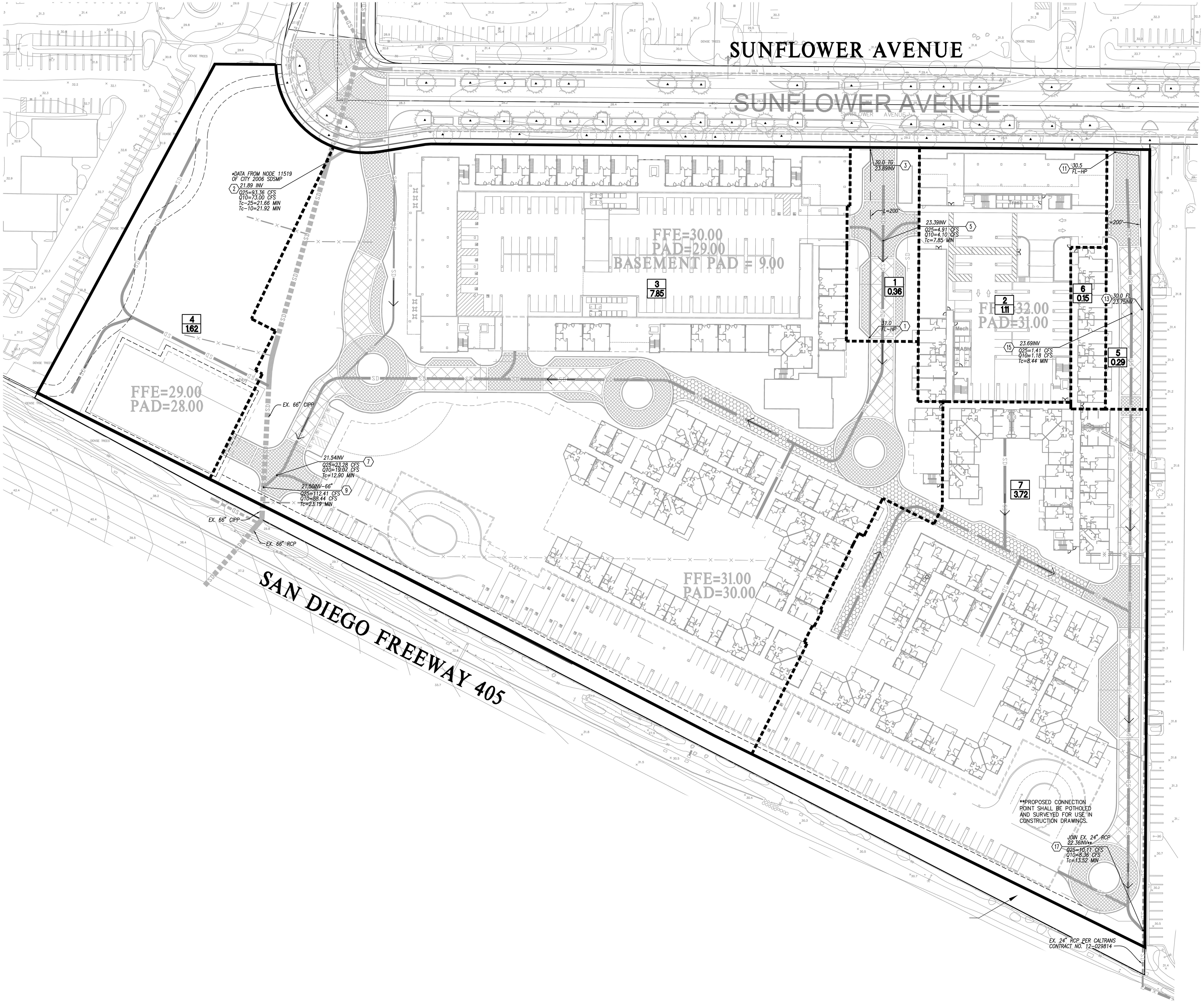
USERNAME => tcpafras
DGN FILE => c02981i03.dgn

CU 12550

EA 029811

APPENDIX D

HYDROLOGY MAPS



LEGEND

Symbol	Description
(solid heavy line)	TRIBUTARY BOUNDARY
(heavy dashed line)	SUB-AREA BOUNDARY
(dash-dot arrow line)	FLOWLINE AND DIRECTION OF FLOW
X / Y	SUB-AREA LABEL / AREA (ACRES)
(100)	NODE NUMBER
Q25	25 YEAR PEAK FLOW (CFS)
Q25	25 YEAR CONFLUENCE PEAK FLOW (CFS)
Tc	TIME OF CONCENTRATION (25 YEAR STORM, IN MIN.)
MIN	MINUTES
CFS	CUBIC FEET PER SECOND
EG	EXISTING GRADE ELEVATION
FG	FINISH GRADE ELEVATION
FL	FLOW LINE ELEVATION
INV	INVERT OF PIPE
L=X'	LENGTH OF FLOWPATH (FT)
(x-line)	EXISTING STORM DRAIN TO ABANDONED/REMOVED

HYDROLOGIC SOIL TYPE 'A' & 'C' (OC SOILS MAP)

GRAPHIC SCALE

40 0 20 40 80

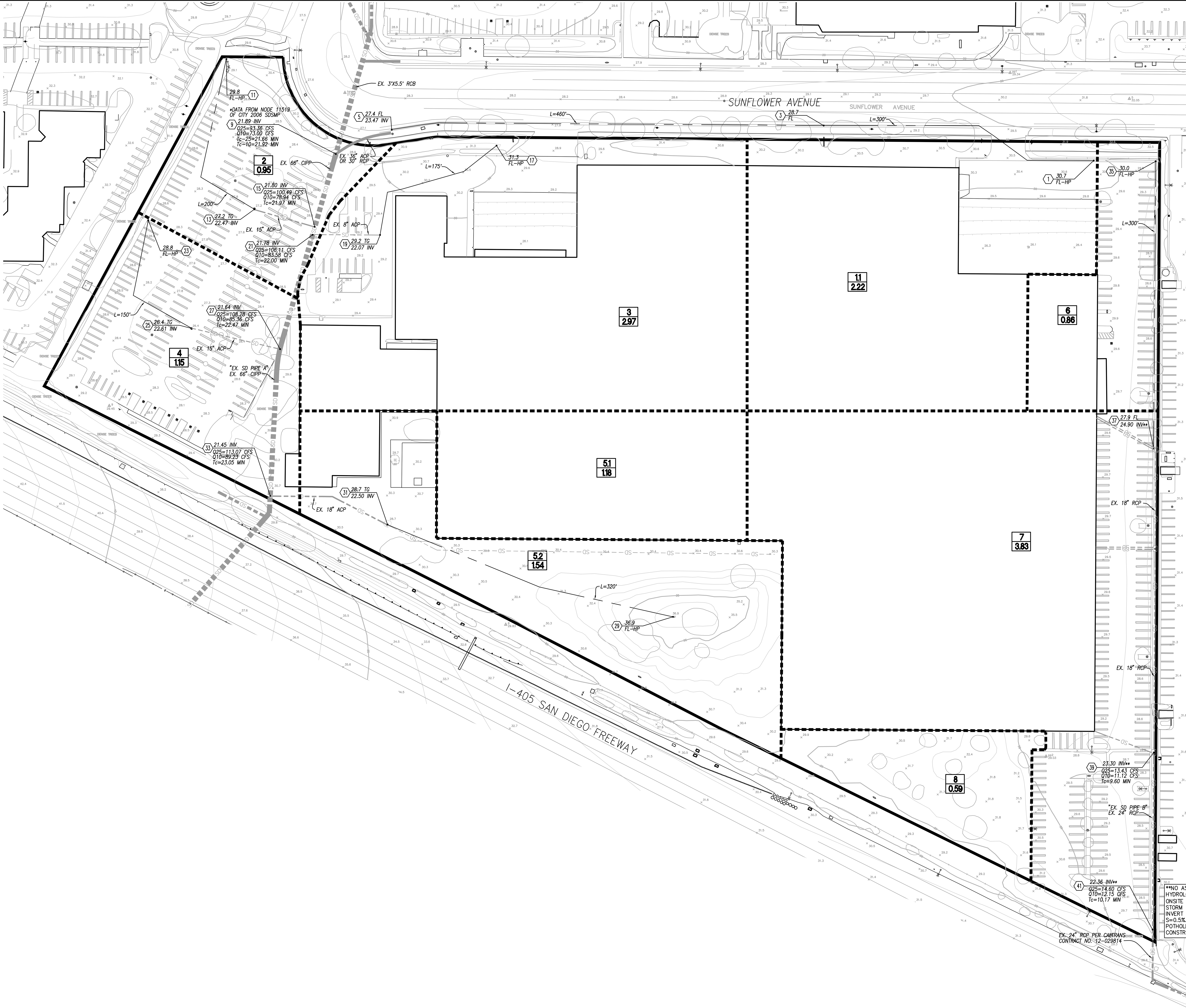
(IN FEET)
1 inch = 40 feet

PROPOSED CONDITION

URBAN RESOURCE
CONSULTING CIVIL ENGINEERS

23 MAUCHLY, SUITE 110
IRVINE, CA 92618
949-727-9095 PHONE
949-727-9098 FAX

PRELIMINARY HYDROLOGY STUDY
ONE METRO WEST
CITY OF COSTA MESA, CA



LEGEND

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HYDROLOGIC SOIL TYPE 'A' & 'C' (OC SOILS MAP)

GRAPHIC SCALE

40 0 20 40 80

(IN FEET)

1 inch = 40 feet

**NO AS-BUILT DRAWINGS OR SDSMP HYDROLOGY DATA AVAILABLE FROM CITY FOR ONSITE EASTERLY "EX. SD PIPE B" PRIVATE RCP STORM DRAIN. FOR THE PURPOSE OF MODELING, INVERT ELEVATIONS ASSUME A PIPE SLOPE OF S=0.5%. PROPOSED CONNECTION POINT SHALL BE POTHOLED AND SURVEYED FOR USE IN CONSTRUCTION DRAWINGS.

EXISTING CONDITION

URBAN RESOURCE
CONSULTING CIVIL ENGINEERS
23 MAUCHLY, SUITE 110
IRVINE, CA 92618
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949-727-9098 FAX

PRELIMINARY HYDROLOGY STUDY
ONE METRO WEST
CITY OF COSTA MESA, CA

P:\285.653\HYDROLOGY\653-HYD-EX.dwg
Nov 01, 2019 – 2:19PM