SUBAREA 29 SPECIFIC PLAN AMENDMENT HYDROLOGY AND HYDRAULICS REPORT

Ontario, California

May 11, 2022

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Table of Contents

Exhibits

Technical Appendix

1 INTRODUCTION

1.1 Project Overview

Lewis Management Corp. and Richland Communities has requested Q3 Consulting (Q3) to prepare a hydrology and hydraulics study of Planning Areas (PA) 32, 33, and 34 located in the City of Ontario, in San Bernardino County. PA 32, 33, and 34 are new planning areas that are proposed to be added to the Subarea 29 Specific Plan as part of the Subarea 29 Specific Plan Amendment. PA 30 and PA 31 are part of the Subarea 29 Specific Plan Amendment area, however, PAs 30 and 31 would adhere to the runoff yields identified in the City of Ontario 2012 Master Plan of Drainage with Subsequent Approved Revisions (2012 Ontario MPD), which anticipates development of the original Subarea 29 Specific Plan area (including PAs 30 and 31).

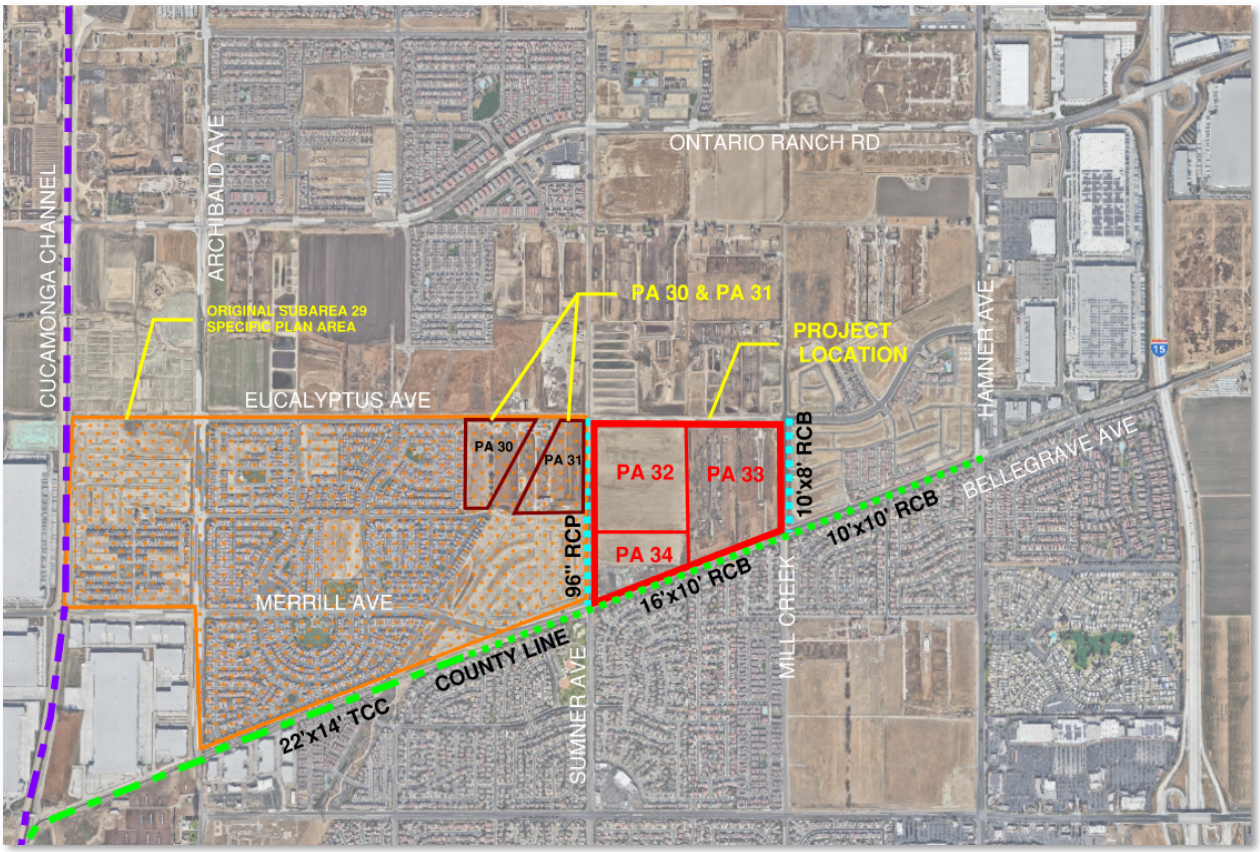
The "project site" for this study includes PAs 32, 33 and 34, which encompass approximately 113 acres, and the adjacent public roadway right-of-way (approximately 11.7 acres). The project site is bounded to the west by Haven Ave, to the south by Bellegrave Ave, to the east by Mill Creek, and to the north by Eucalyptus Ave. Proposed runoff from the project site is planned to drain to the existing storm drain underneath Haven Ave, the existing storm drain underneath Mill Creek, and to the existing County drainage facility located along Bellegrave Avenue (County Line Channel). The storm drain lines along Haven Ave and Mill Creek confluence with the County Line Channel. From the County Line Channel, runoff is ultimately discharged into Cucamonga Channel.

The land uses of PA 32, 33, 34 are proposed to be more impervious than what was proposed in the 2012 MPD. Specifically, the 2012 Ontario MPD assumed development of these PAs with low density residential area, school area, and lake area, and the Project includes the development of mixed residential and school uses. The following report provides an evaluation of the hydrologic and hydraulic impacts on the backbone storm drain lines along Mill Creek and Haven Ave, and the County Line Channel due to the amended land uses.

The location of the study area, project location, and the pertinent existing drainage facilities are shown in Figures 1-1 and 1-2.

Figure 1-1. Vicinity Map

Figure 1-2. Project Location Map



1.2 Goals and Objectives

The purpose of this report is to evaluate the hydrology and hydraulics of the revised land use plan and quantify any potential impacts and mitigation measures needed for the existing storm drain main lines and County Line Channel.

The primary objectives of this study include the following:

- Research, collect, and review previous studies completed in the watershed and along the project
- Establish the design criteria and requirements to be used for the hydrologic and hydraulic impact evaluation
- Calculate the 100-year peak flow per San Bernardino County Hydrology Manual methodology for the County Line Channel, the Haven Ave storm drain and the Mill Creek storm drain
- For each of the three drainage facilities, compare the difference between the peak flow rate from this analysis and the 2012 Ontario Master Plan of Drainage (MPD)
- Based on the hydrology results, develop Water Surface and Pressure Gradient (WSPG) models of the County Line Channel, the storm drain line under Mill Creek, and the storm drain line under Haven Avenue
- Provide recommendations for flood control mitigation measures if necessary

2 DESIGN CRITERIA

The hydrology and hydraulic criteria for the design of storm drain systems is based on the County of San Bernardino requirements. In general, the hydrology guidelines are stated in the San Bernardino County Hydrology Manual.

The 2012 Ontario MPD hydrology results were used as the basis for the evaluation of the County Line Channel and storm drain lines underneath Mill Creek and Haven Ave.

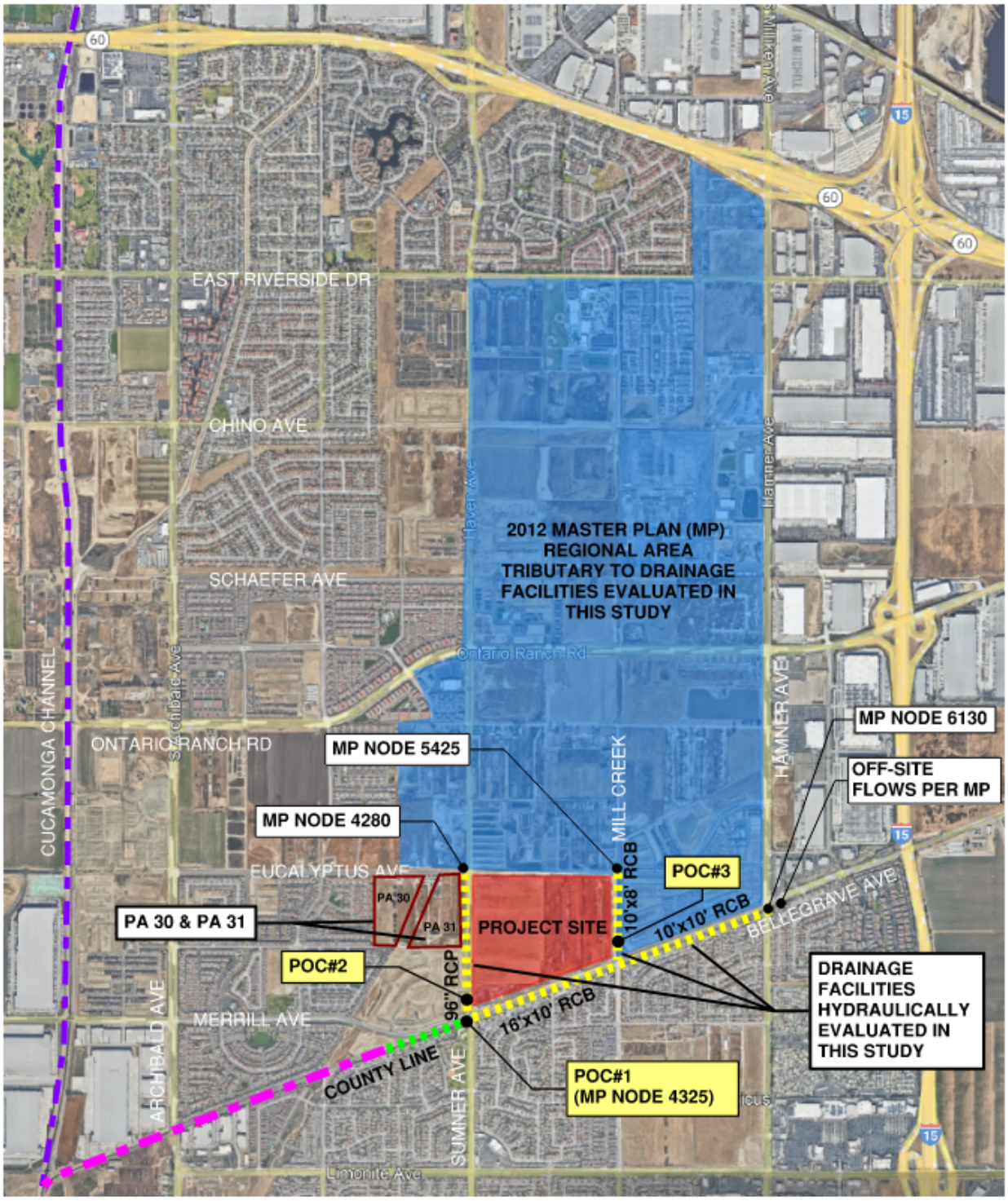
County Line Channel Point of Comparison (POC#1) for 100-Year Peak Flow:
For the County Line Channel analysis, the intersection at Bellegrave Ave and Haven Ave was selected as the point of comparison (POC) for peak flow. This POC is labeled as Node 4325 on the 2012 Ontario MP. At this location, the proposed development's impact on the 100-year peak flow in the CLC was compared to the peak flow previously calculated in the 2012 MP.

Haven Ave Storm Drain Point of Comparison (POC#2) for 100-Year Peak Flow:
For the hydrologic analysis of the storm drain along Haven Ave, just upstream of the confluence with the County Line Channel was selected as the point of comparison for peak flow.

Mill Creek Storm Drain Point of Comparison (POC#3) for 100-Year Peak Flow:
For the hydrologic analysis of the storm drain along Mill Creek, just upstream of the confluence with the County Line Channel was selected as the point of comparison for peak flow.

County Line Channel Tailwater Elevation based on 2012 MP Hydrology:
A fixed tailwater elevation needed to be assumed for the hydraulic analysis of the County line. The tailwater elevation of 669.16 ft at Station 86+18.22 (approximately 500 feet downstream of the Haven Ave and Bellegrave Ave intersection) used for this analysis was taken from the Master Plan County line analysis in "Preliminary Hydrology and Hydraulic Study for the San Bernardino County Flood Control Districts County Line Channel" (2011, Hunsaker & Associates).

Figure 2-1. Regional Drainage Map



3 HYDROLOGY

In addition to the land use change, the proposed drainage pattern and delineation within PAs 32 to 34 differ from what was previously proposed in the 2012 Ontario MPD. Exhibit B and Exhibit C show the drainage delineation and patterns originally proposed in the 2012 Ontario MPD and provide a comparison to the current proposed design. New initial areas were delineated where there is a new inflow point along the County Line Channel that was not in the 2012 Ontario MPD.

3.1 Methodology

The hydrology was prepared in accordance with the San Bernardino County Hydrology Manual and used the same hydrologic parameters used in the 2012 Ontario MP. The 100-year peak flow rates were calculated using the Integrated Rational and Unit Hydrograph Method in Advanced Engineering Software (AES).

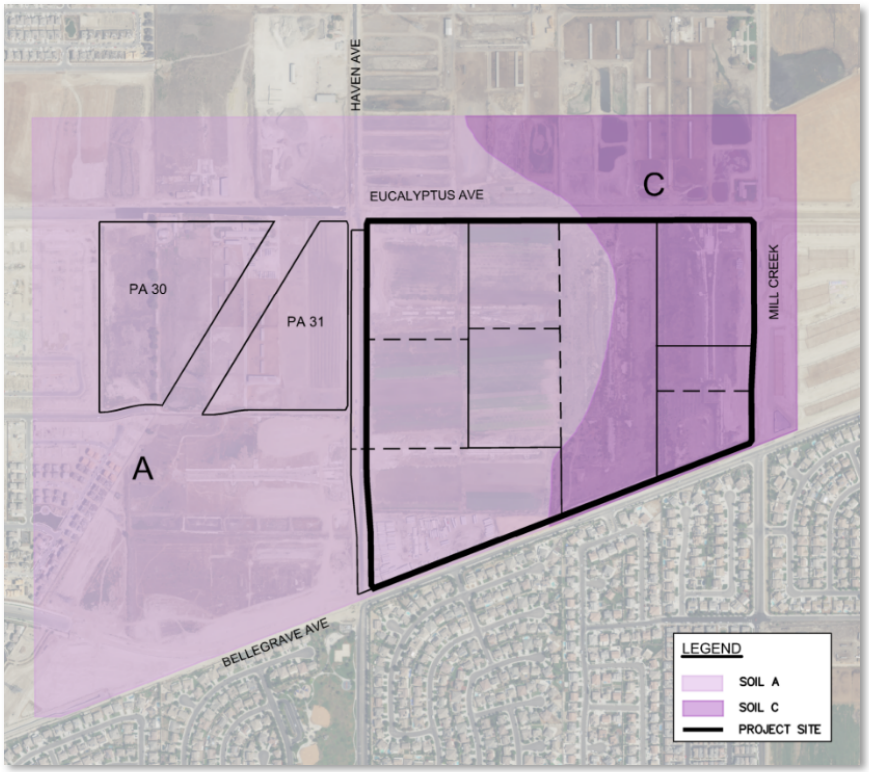
3.2 Rainfall Data

The same precipitation data used in the 2012 Ontario MP was used for this analysis. 100-year storm event, AMC 2, and 1-hour rainfall intensity of 1.2 in/hr was used.

3.3 Soil Type

The soil data from the United States Department of Agriculture Natural Resources Conservation Service National Cooperative Soil Survey (NCSS) was used for this analysis. PA 32 and PA 34 are primarily composed of soil group A and PA 33 is primarily composed of soil group C.

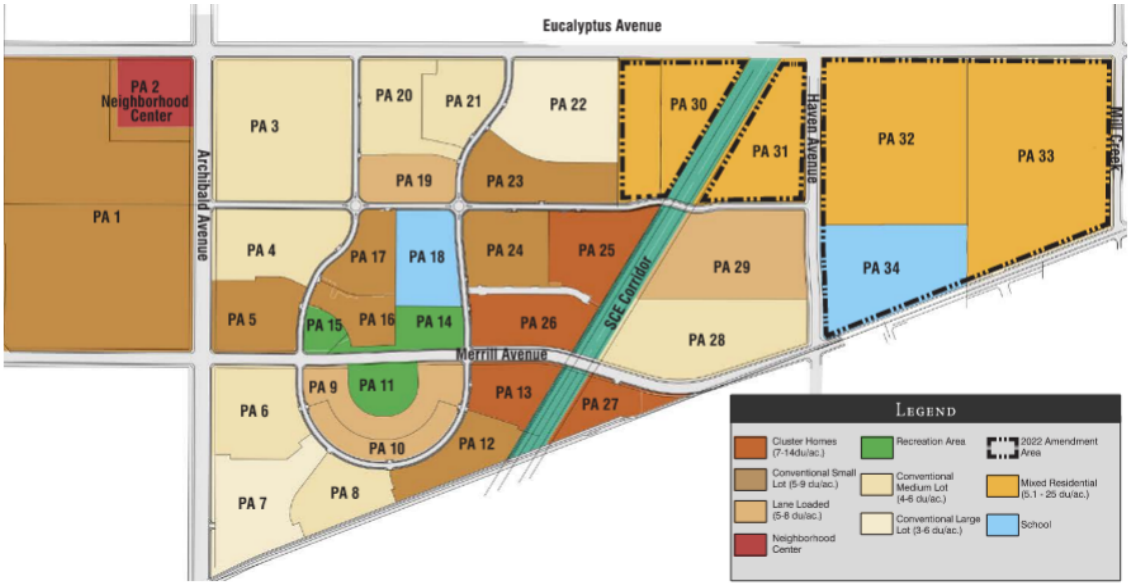
Figure 3-1. Soil Map



3.4 Land Use

The land uses of PA 32, 33, 34 are proposed to be more impervious than what was proposed in the 2012 Ontario MP. In the MP, PAs 32, 33, 34 were proposed to have low density residential area, school area, and lake area. Currently, PA 32 and PA 33 are proposed to be mixed residential and PA 34 is proposed to be for school use. For the hydrologic analysis, the land uses for PA 32 and PA 33 were selected from the standard land uses defined in San Bernardino County Hydrology Manual (SBCHM) that most resembled the PA's imperviousness and intended function. PA 32 and PA 33 were assigned the SBCHM land use "Apartments" and PA 34 was assigned the SBCHM land use of "School." The SBCHM "Apartment" land use is 80% impervious and the SBCHM "School" land use is 40% impervious. Figure 3.2 shows the proposed land uses for this study.

Figure 3-2. Proposed Land Use Plan



3.5 Regional Master Plan Flows

The tributary Master Plan hydrology for the following locations was included in this analysis:

- MP Node 4280 (intersection at Haven Ave and Eucalyptus Ave)
- MP Node 5425 (intersection at Mill Creek and Eucalyptus Ave)
- Tributary areas along Bellegrave Ave from Mill Creek to Hamner Ave
- MP Node 6130 (intersection at Hamner Ave and Bellegrave Ave)
- Master Plan off-site flows from Hamner Ave (formerly known as Milliken Ave)

3.6 Hydrology Results

The following table shows the peak 100-year flowrate at locations along both the City and County drainage systems. The node located furthest downstream in the analysis is along the County Line Channel at MP Node 4325/ POC #1.

Table 3-1. Hydrology Point of Comparison (POC) Results

POC	Drainage System	Total Tributary Area per 2012 MP (ac)	Proposed Total Tributary Area (ac)	Tc per 2012 MP (min)	Proposed Tc (min)	Q_{100} per 2012 MP (cfs)	Proposed Q_{100} (cfs)
1	County Line Channel	2,360	2,361.5	43.7	43.46	2,385.1	2,388.50
2	Haven SD	592.1	556.6	22.7	22.39	755	700.43
3	Mill Creek SD	886.1	864.9	39.4	39.34	1,153.5	1,129.93

At POC#1/MP Node 4325 along the County Line Channel, the 100-year peak flow rate is 2,388.5 cfs and the 2012 Ontario MPD peak flow rate was 2,385.1 cfs. There is an increase of 3.4 cfs to the County Line Channel due to the proposed design. Section 4 of this report demonstrates that the County Line Channel has the capacity to convey an additional 3.4 cfs and the increase in peak flow rate would not have an impact on the facility.

For Haven and Mill Creek storm drains (POC #2, POC #3), the peak flows are less than the 2012 Ontario MPD peak flows. This is primarily due to the reduction of proposed flows to discharge to the Haven Ave and Mill Creek storm drains compared to the previous 2012 Ontario MPD. In the current proposed design, areas that were once tributary to the Haven and Mill Creek storm drain lines (Areas N6, N7, P1, P3, P4 as shown in Exhibit A) in the MPD are now proposed to drain directly to the County Line Channel. Exhibit B and Exhibit C demonstrate the difference in tributary areas for the Haven and Mill Creek storm drains between the MPD and the currently proposed design.

4 HYDRAULIC ANALYSES

4.1 Methodology

The hydraulic analysis of the County Line Channel and the Mill Creek and Haven Ave storm drain lines was computed using the Water Surface and Pressure Gradient (WSPG) computer program.

The County line was hydraulically evaluated from Haven Ave to Mill Creek. The Haven storm drain was evaluated from Bellegrave Ave to Eucalyptus Ave. The Mill Creek storm drain was evaluated from Bellegrave Ave to Eucalyptus Ave.

County Line Channel Tailwater Elevation based on 2012 MP Hydrology:
A fixed tailwater elevation needed to be assumed for the hydraulic analysis of the County line. The tailwater elevation of 669.16 ft at Station 86+18.22 (approximately 500 feet downstream of the Haven Ave and Bellegrave Ave intersection) used for this analysis was taken from the Master Plan County Line analysis in "Preliminary Hydrology and Hydraulic Study for the San Bernardino County Flood Control Districts County Line Channel" (2011, Hunsaker & Associates).

Mainline Storm Drain Tailwater Elevation based on Updated County Line Hydrology:
A tailwater is the water surface elevation at the most downstream end of a drainage facility. The fixed tailwater elevations used for the Mill Creek storm drain and Haven Ave storm drain were taken from the updated hydraulic results of the County Line Channel.

4.2 Hydraulic Results

The updated hydraulic grade line (HGL) for the Haven Ave storm drain line is above the as-built HGL an approximate maximum of 0.6 feet from the County Line Channel confluence point to approximately 500 feet upstream the storm drain line. The increase in HGL is primarily due to the updated tailwater elevation from the County Line Channel, which is approximately 0.6 feet higher than the tailwater used on the as-built plans. For the remaining upstream portion of the Haven storm drain line, the updated HGL is below the as-built HGL. This is primarily due to the reduction in proposed flows to discharge to the Haven Ave storm drain compared to the previous 2012 Ontario MPD.

The updated hydrology (Q100 peak flowrate) for the Mill Creek storm drain is less than that identified in the 2012 Ontario MPD. Both this study and the 2012 Ontario MPD showed Q100 peak flowrates slightly higher than those identified in the as-built plans. Since the MPD is an approved report, the decrease in flowrate per this study is comparatively a benefit to the proposed condition flows identified in the MPD. The calculated HGL for the Mill Creek storm drain line varies between 0-1 feet above that identified in the as-built plans from approximately Sta 17+00 to Sta 24+79.67. However, within this reach there is a minimum of 3 feet of freeboard in the system. A low point exists in the proposed finished surface at approximately Sta 12+00. At this location the calculated HGL is similar to the as-built HGL and there is no calculated impact to the storm drain line.

The County Line Channel HGL based on the updated hydrology results is below the HGL that is shown in the as-builts. The updated HGL is above the MPD HGL from Hamner Avenue to approximately 1,400 feet downstream of Mill Creek (Node 8003 on Exhibit A) at a maximum of 0.2 feet, yet well below the finished grade. From MPD Node 8003 to Hamner Avenue the updated HGL is greater than the MPD HGL at a maximum of 0.1 feet. Based on the findings of this study the County Line Channel has the capacity to convey the updated 100-year peak flow.

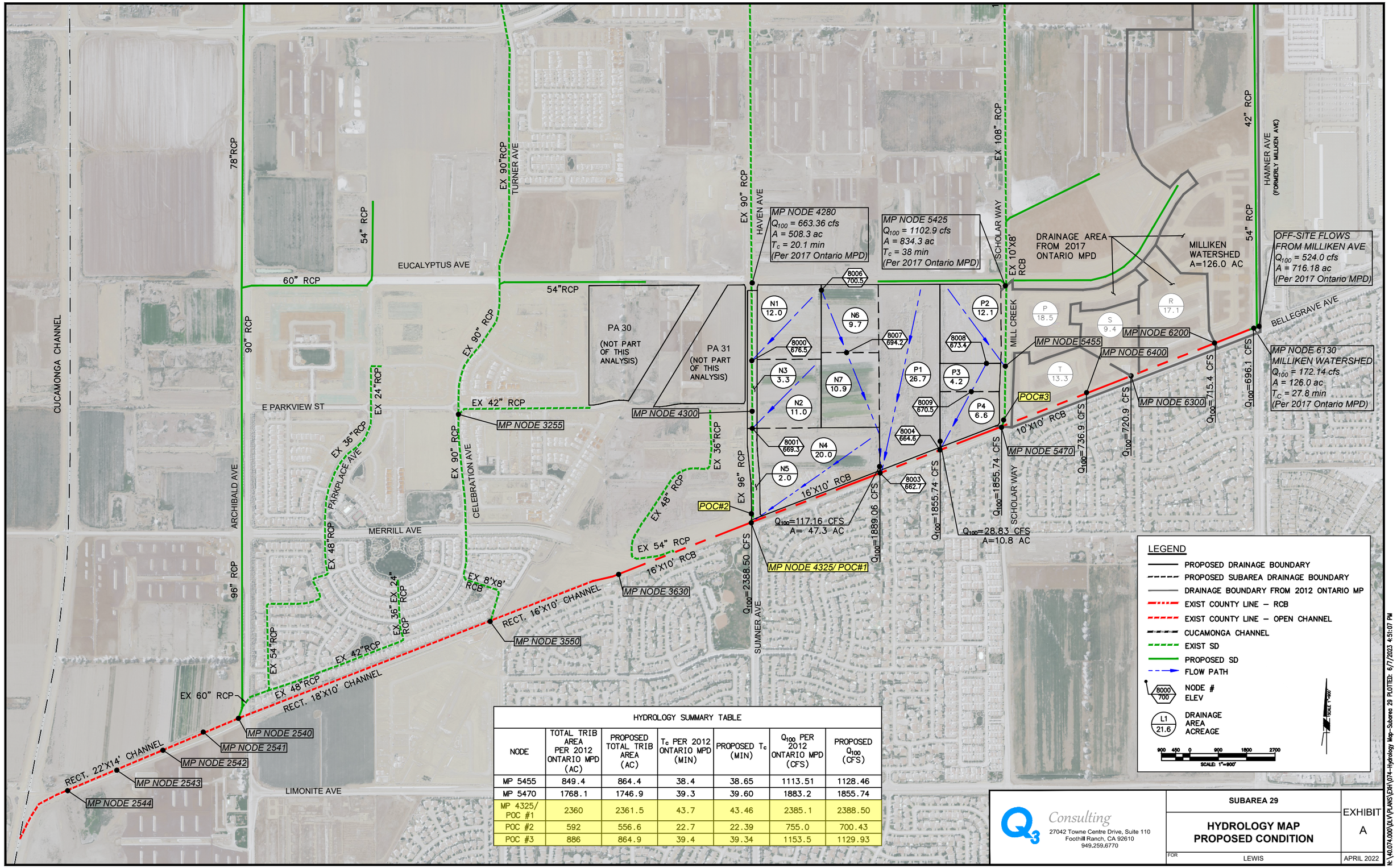
5 CONCLUSIONS

The updated HGL in Haven Avenue storm drain is above the as-built HGL by a maximum of 0.6 feet from the confluence point with the County Line Channel to approximately 500 feet upstream along the storm drain line. The remaining upstream portion of the Haven storm drain line is below the as-built HGL. The peak flows in the storm drain system are less than those identified in the approved MPD.

The calculated HGL for the Mill Creek storm drain line varies between 0-1 feet above that identified in the as-built plans from approximately Sta 17+00 to Sta 24+79.67. However, within this reach there is a minimum of 3 feet of freeboard in the system. A low point exists in the proposed finished surface at approximately Sta 12+00. At this location the calculated HGL is similar to the as-built HGL and there is no calculated impact to the storm drain line. The calculated peak flows in the storm drain system are less than those identified in the approved MPD.

The proposed peak 100-year flow calculated in this study for the County Line Channel is 3.4 cfs higher than the flows identified in the MPD at the Haven Avenue and Bellegrave Avenue intersection. The updated HGL in the County Line Channel is below the as-built HGL and slightly above the MPD HGL by a maximum of 0.2 feet. This slight increase in HGL still contains freeboard to the finished grade.

Based on this analysis, the County Channel Line and main storm drain lines servicing PAs 32, 33, and 34 maintain adequate freeboard capacity for the proposed change in land use designations. Therefore, development of PAs 32, 33 and 34 per the proposed Subarea 29 Specific Plan Amendment, would not require new or expanded storm drainage facilities beyond the existing storm drain system.



HYDROLOGY SUMMARY TABLE

NODE	TOTAL TRIB AREA PER 2012 ONTARIO MPD (AC)	PROPOSED TOTAL TRIB AREA (AC)	T_c PER 2012 ONTARIO MPD (MIN)	PROPOSED T_c (MIN)	Q_{100} PER 2012 ONTARIO MPD (CFS)	PROPOSED Q_{100} (CFS)
MP 5455	849.4	864.4	38.4	38.65	1113.51	1128.46
MP 5470	1768.1	1746.9	39.3	39.60	1883.2	1855.74
MP 4325/ POC #1	2360	2361.5	43.7	43.46	2385.1	2388.50
POC #2	592	556.6	22.7	22.39	755.0	700.43
POC #3	886	864.9	39.4	39.34	1153.5	1129.93

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SUBAREA 29

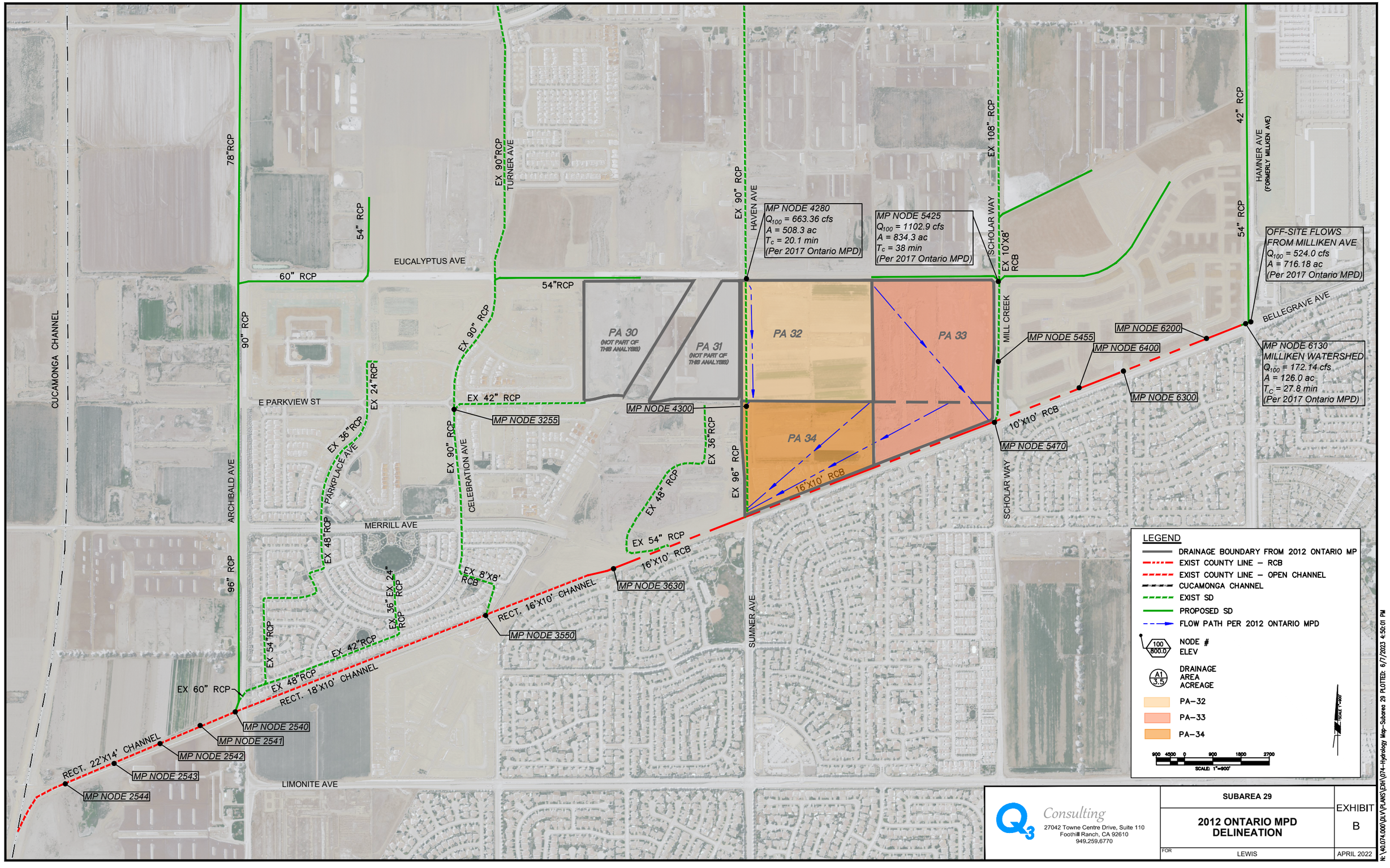
HYDROLOGY MAP
PROPOSED CONDITION

FOR LEWIS

EXHIBIT A

APRIL 2022

N:\40.074.000\DLV\PLANS\EXH\074-Hydrology Map-Subarea 29 PLOTTED: 6/7/2023 4:51:07 PM



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SUBAREA 29

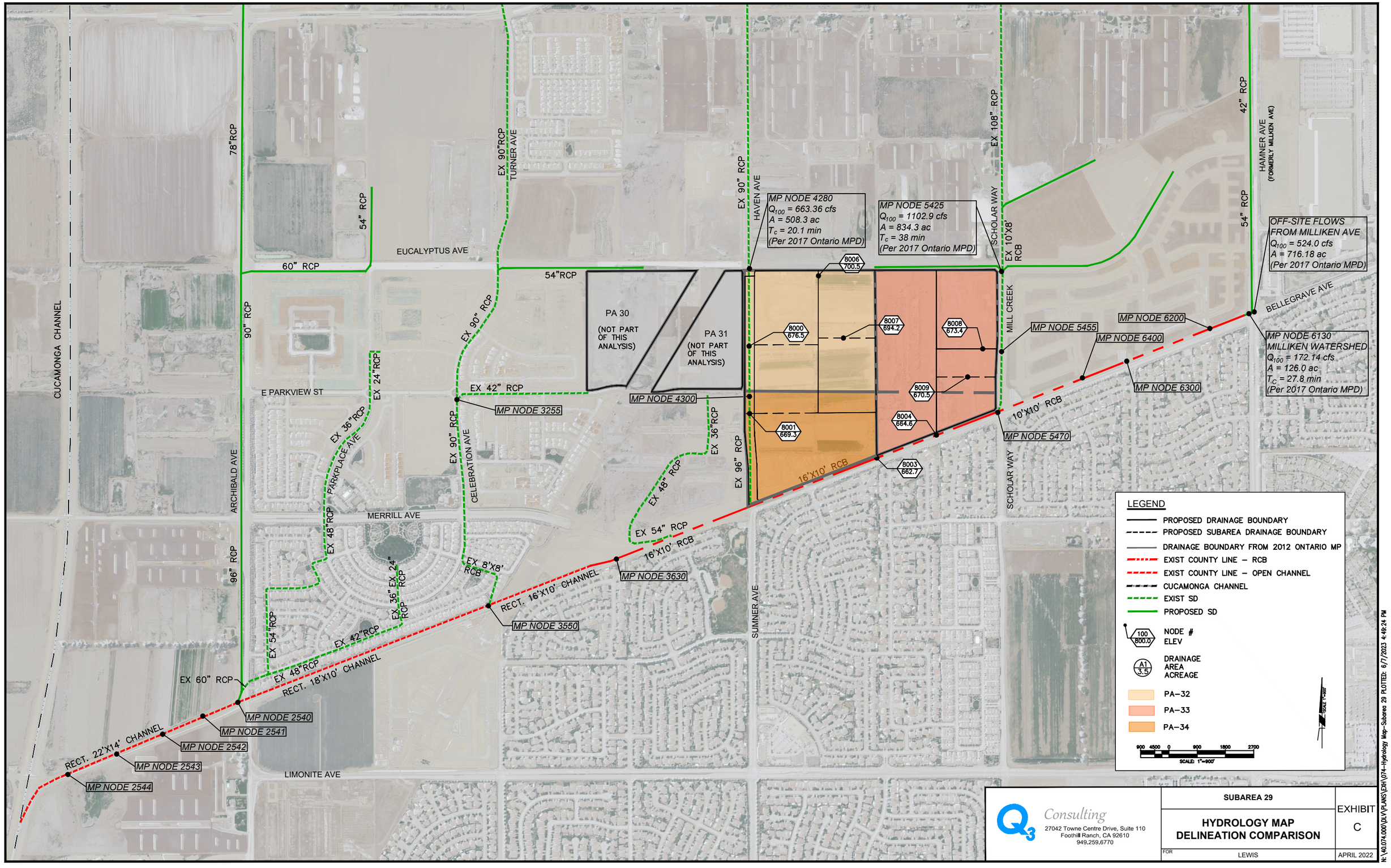
2012 ONTARIO MPD DELINEATION

EXHIBIT B

FOR LEWIS

APRIL 2022

N:\A0.074.000\DLV\PLANS\EXH\074-Hydrology Map-Subarea 29 PLOTTED: 6/7/2023 4:50:01 PM



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SUBAREA 29

HYDROLOGY MAP
DELINEATION COMPARISON

EXHIBIT C

FOR LEWIS

APRIL 2022

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APPENDIX

Appendix A – Hydrology

- **County Line Channel 100-yr AES Results**
- **Haven Ave SD 100-yr AES Results**
- **Mill Creek SD 100-yr AES Results**
- **Milliken Watershed 100-yr AES Results**

Q3 Consulting

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**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2015 Advanced Engineering Software (aes)
             Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                         Analysis prepared by:
```

County Line Channel - Proposed Condition

```
     ************************ DESCRIPTION OF STUDY ************************
    * SUBAREA 29                                                         *
    * COUNTY LINE CHANNEL                                                *
    * PROPOSED CONDITION 100YR                                           *
     **********************************************************************

  FILE NAME: COUNTY.DAT
  TIME/DATE OF STUDY: 12:39 04/22/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

  UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:
    WATERSHED LAG = 0.80 * Tc
    USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF
    2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH
```



```
    FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
    SIERRA MADRE DEPTH-AREA FACTORS USED.
                        AREA-AVERAGED
         DURATION    RAINFALL(INCH)
          5-MINUTES          0.44
         30-MINUTES          0.91
          1-HOUR             1.20
          3-HOUR             2.10
          6-HOUR             3.00
         24-HOUR             6.00
 *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD*


**************************************************************************
  FLOW PROCESS FROM NODE    6000.00 TO NODE    6130.00 IS CODE = 15.1
--------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<
==========================================================================
  PEAK FLOWRATE TABLE FILE NAME: MILLIKEN.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS) (MIN.)  (INCH/HR)          (ACRES)     NODE
      1      172.14   27.82  0.65( 0.20) 0.31     110.5    6080.00
      2      171.76   29.40  0.65( 0.20) 0.31     114.4    6110.00
      3      161.71   36.89  0.66( 0.19) 0.30     126.0    6000.00
    TOTAL AREA(ACRES) =      126.0
  LONGEST FLOWPATH FROM NODE    6000.00 TO NODE    6130.00 =   12690.00 FEET.
```

Milliken Watershed per 2012 MP

```
**************************************************************************
  FLOW PROCESS FROM NODE    6130.00 TO NODE    6130.00 IS CODE = 14.0
--------------------------------------------------------------------------
  >>>>>MEMORY BANK #  1 COPIED ONTO MAIN-STREAM MEMORY<<<<<
==========================================================================

  MAIN-STREAM MEMORY DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.)  (INCH/HR)          (ACRES)     NODE
      1      172.14   27.82  0.65( 0.20) 0.31     110.5    6080.00
      2      171.76   29.40  0.65( 0.20) 0.31     114.4    6110.00
      3      161.71   36.89  0.66( 0.19) 0.30     126.0    6000.00
    TOTAL AREA(ACRES) =       126.0
  LONGEST FLOWPATH FROM NODE    6000.00 TO NODE    6130.00 =   12690.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    6130.00 TO NODE    6130.00 IS CODE =  16
--------------------------------------------------------------------------
  >>>>>USER SPECIFIED CONSTANT SOURCE FLOW AT NODE<<<<<
==========================================================================
  USER-SPECIFIED CONSTANT SOURCE FLOW =   524.00(CFS)
  USER-SPECIFIED AREA ASSOCIATED TO SOURCE FLOW =   716.18(ACRES)
  * CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =   524.00  AREA(AC.) =   716.18
  * SUMMED DATA: FLOW(CFS) =   696.14    TOTAL AREA(ACRES) =   842.18

**************************************************************************
  FLOW PROCESS FROM NODE    6130.00 TO NODE    6200.00 IS CODE =  48
--------------------------------------------------------------------------
  >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
==========================================================================
```

Offsite Flows per 2012 MP

```
  ELEVATION DATA: UPSTREAM(FEET) =   673.60  DOWNSTREAM(FEET) =   672.60
  FLOW LENGTH(FEET) =   374.00   MANNING'S N =  0.015
  GIVEN BOX BASEWIDTH(FEET) =  10.00   GIVEN BOX HEIGHT(FEET) =  10.00
  FLOWDEPTH IN BOX IS  6.73 FEET   BOX-FLOW VELOCITY(FEET/SEC.) =  10.34
  BOX-FLOW(CFS) =     696.14
  BOX-FLOW TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =   28.43
  * TOTAL SOURCE FLOW(CFS) =     524.00
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6200.00 =   13064.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6200.00 TO NODE   6200.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.879
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C       17.10      0.57     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   17.10      SUBAREA RUNOFF(CFS) =   24.56
  EFFECTIVE AREA(ACRES) =    127.61   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.63  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =      143.1       PEAK FLOW RATE(CFS) =     191.30

  * SOURCE FLOW DATA: FLOW(CFS) =     524.00     AREA(ACRES) =      716.2
  * SUMMED DATA: FLOW(CFS) =     715.30    TOTAL AREA(ACRES) =      859.3

  ** PEAK FLOW RATE TABLE **
STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER  SOURCE
NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE      FLOW
   1      191.41   28.40    1.880  0.63( 0.21) 0.34     127.6    6080.00   524.0
   2      190.26   29.95    1.821  0.63( 0.21) 0.34     131.5    6110.00     0.0
   3      178.71   37.43    1.593  0.64( 0.21) 0.32     143.1    6000.00     0.0
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     191.41  Tc(MIN.) =   28.40
  AREA-AVERAGED Fm(INCH/HR) =  0.21  AREA-AVERAGED Fp(INCH/HR) =  0.63
  AREA-AVERAGED Ap =  0.34  EFFECTIVE AREA(ACRES) =     127.61

  * CUMULATIVE SOURCE FLOW DATA:
    FLOW(CFS) =     524.00         AREA(ACRES) =      716.2
  * SUMMED DATA:
    FLOW(CFS) =     715.41   TOTAL AREA(ACRES) =      843.8

****************************************************************************
  FLOW PROCESS FROM NODE   6200.00 TO NODE   6300.00 IS CODE =  48
----------------------------------------------------------------------------
  >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   672.60  DOWNSTREAM(FEET) =   669.40
  FLOW LENGTH(FEET) =  1140.00   MANNING'S N =  0.015
  GIVEN BOX BASEWIDTH(FEET) =  10.00   GIVEN BOX HEIGHT(FEET) =  10.00
  FLOWDEPTH IN BOX IS  6.75 FEET   BOX-FLOW VELOCITY(FEET/SEC.) =  10.60
  BOX-FLOW(CFS) =     715.41
  BOX-FLOW TRAVEL TIME(MIN.) =   1.79    Tc(MIN.) =   30.19
```


Area R per 2012 MP

```
  * TOTAL SOURCE FLOW(CFS) =     524.00
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6300.00 =   14204.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6300.00 TO NODE   6300.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.812
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        9.40      0.57     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    9.40      SUBAREA RUNOFF(CFS) =   12.93
  EFFECTIVE AREA(ACRES) =    137.01   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.62  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =      152.5       PEAK FLOW RATE(CFS) =     196.56

  * SOURCE FLOW DATA: FLOW(CFS) =     524.00     AREA(ACRES) =      716.2
  * SUMMED DATA: FLOW(CFS) =     720.56    TOTAL AREA(ACRES) =      868.7

  ** PEAK FLOW RATE TABLE **
STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER  SOURCE
NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE      FLOW
   1      196.89   30.12    1.814  0.62( 0.22) 0.35     137.0    6080.00   524.0
   2      195.96   31.60    1.763  0.63( 0.22) 0.35     140.9    6110.00     0.0
   3      184.39   39.02    1.553  0.63( 0.21) 0.33     152.5    6000.00     0.0
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     196.89  Tc(MIN.) =   30.12
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.62
  AREA-AVERAGED Ap =  0.35  EFFECTIVE AREA(ACRES) =     137.01

  * CUMULATIVE SOURCE FLOW DATA:
    FLOW(CFS) =     524.00         AREA(ACRES) =      716.2
  * SUMMED DATA:
    FLOW(CFS) =     720.89   TOTAL AREA(ACRES) =      853.2

****************************************************************************
  FLOW PROCESS FROM NODE   6300.00 TO NODE   6400.00 IS CODE =  48
----------------------------------------------------------------------------
  >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   669.40  DOWNSTREAM(FEET) =   668.60
  FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.015
  GIVEN BOX BASEWIDTH(FEET) =  10.00   GIVEN BOX HEIGHT(FEET) =  10.00
  FLOWDEPTH IN BOX IS  6.86 FEET   BOX-FLOW VELOCITY(FEET/SEC.) =  10.51
  BOX-FLOW(CFS) =     720.89
  BOX-FLOW TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   30.59
  * TOTAL SOURCE FLOW(CFS) =     524.00
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6400.00 =   14497.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6400.00 TO NODE   6400.00 IS CODE =  81
----------------------------------------------------------------------------
```

Area S per 2012 MP

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   30.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.798
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C       12.30      0.57     0.500    69
  PUBLIC PARK                C        1.00      0.57     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.526
  SUBAREA AREA(ACRES) =   13.30      SUBAREA RUNOFF(CFS) =   17.95
  EFFECTIVE AREA(ACRES) =    150.31   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.62  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =      165.8       PEAK FLOW RATE(CFS) =     212.80

  * SOURCE FLOW DATA: FLOW(CFS) =     524.00     AREA(ACRES) =      716.2
  * SUMMED DATA: FLOW(CFS) =     736.80    TOTAL AREA(ACRES) =      882.0

  ** PEAK FLOW RATE TABLE **
STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER  SOURCE
NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE      FLOW
   1      212.88   30.57    1.799  0.62( 0.22) 0.36     150.3    6080.00   524.0
   2      211.53   32.03    1.749  0.62( 0.22) 0.36     154.2    6110.00     0.0
   3      197.96   39.43    1.544  0.63( 0.22) 0.35     165.8    6000.00     0.0
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     212.88  Tc(MIN.) =   30.57
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.62
  AREA-AVERAGED Ap =  0.36  EFFECTIVE AREA(ACRES) =     150.31

  * CUMULATIVE SOURCE FLOW DATA:
    FLOW(CFS) =     524.00         AREA(ACRES) =      716.2
  * SUMMED DATA:
    FLOW(CFS) =     736.88   TOTAL AREA(ACRES) =      866.5

********************************************************************************
  FLOW PROCESS FROM NODE   6400.00 TO NODE   5470.00 IS CODE =  48
--------------------------------------------------------------------------------
  >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   668.60  DOWNSTREAM(FEET) =   666.10
  FLOW LENGTH(FEET) =   990.00   MANNING'S N =  0.015
  GIVEN BOX BASEWIDTH(FEET) =  10.00   GIVEN BOX HEIGHT(FEET) =  10.00
  FLOWDEPTH IN BOX IS  7.20 FEET   BOX-FLOW VELOCITY(FEET/SEC.) =  10.24
  BOX-FLOW(CFS) =     736.88
  BOX-FLOW TRAVEL TIME(MIN.) =   1.61    Tc(MIN.) =   32.18
  * TOTAL SOURCE FLOW(CFS) =     524.00
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   5470.00 =   15487.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   5470.00 TO NODE   5470.00 IS CODE =  12
--------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE   5470.00 TO NODE   5470.00 IS CODE = 15.1
```

Area T per 2012 MP


```
--------------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<
================================================================================
  PEAK FLOWRATE TABLE FILE NAME: PRMCRK.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1129.93    Tc(MIN.) =   39.34
  AREA-AVERAGED Fm(INCH/HR) =  0.22    Ybar = 0.25
  TOTAL AREA(ACRES) =      864.9
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5470.00 =   16638.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   5470.00 TO NODE   5470.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================
```

Mill Creek SD

```
  ** MAIN STREAM CONFLUENCE DATA **
STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER  SOURCE
NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE      FLOW
   1      212.88   32.11    1.746  0.62( 0.22) 0.36     150.3    6080.00   524.0
   2      211.53   33.52    1.702  0.62( 0.22) 0.36     154.2    6110.00   524.0
   3      197.96   40.86    1.511  0.63( 0.22) 0.35     165.8    6000.00   524.0

  * SOURCE FLOW DATA: FLOW(CFS) =   524.00     AREA(ACRES) =   716.18
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   5470.00 =   15487.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  PEAK FLOW RATE(CFS) =     1129.93    Tc(MIN.) =   39.34
  AREA-AVERAGED Fm(INCH/HR) =  0.22    Ybar = 0.25
  TOTAL AREA(ACRES) =      864.9
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5470.00 =   16638.00 FEET.

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.66; LAG(HR) = 0.52; Fm(INCH/HR) = 0.22; Ybar = 0.25
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;
  3HR = 0.99; 6HR = 1.00; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =     1030.7
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5470.00 =   16638.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0298; Lca/L=0.4,n=.0267; Lca/L=0.5,n=.0246;Lca/L=0.6,n=.0229
  TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =     395.87
  PEAK FLOW RATE(CFS) =    1331.74
  * CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =     524.00  AREA(AC.) =      716.2
  * SUMMED DATA: FLOW(CFS) =    1855.74    TOTAL AREA(ACRES) =     1746.9

********************************************************************************
  FLOW PROCESS FROM NODE   5470.00 TO NODE   8004.00 IS CODE =  48
--------------------------------------------------------------------------------
  >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   666.50  DOWNSTREAM(FEET) =   664.60
  FLOW LENGTH(FEET) =   689.20   MANNING'S N =  0.014
  GIVEN BOX BASEWIDTH(FEET) =  16.00   GIVEN BOX HEIGHT(FEET) =  10.00
```

```
 *GIVEN BOX HEIGHT(FEET) =  10.00   ESTIMATED BOX BASEWIDTH(FEET) =   16.47
 ASSUME FULL-FLOWING BOX   BOX-FLOW VELOCITY(FEET/SEC.) =  11.27
 BOX-FLOW(CFS) =    1855.74
 BOX-FLOW TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =   40.36
 * TOTAL SOURCE FLOW(CFS) =     524.00
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   8004.00 =   17327.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   8004.00 TO NODE   8004.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   8004.00 TO NODE   8004.00 IS CODE = 15.1
----------------------------------------------------------------------------
 >>>>>DEFINE MEMORY BANK # 1 <<<<<
============================================================================
 PEAK FLOWRATE TABLE FILE NAME: p3.DNA
 MEMORY BANK #  1 DEFINED AS FOLLOWS:
  STREAM       Q      Tc      Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS) (MIN.)  (INCH/HR)         (ACRES)    NODE
     1       28.83   12.47  0.57( 0.11) 0.20      10.8    8008.00
   TOTAL AREA(ACRES) =       10.8
 LONGEST FLOWPATH FROM NODE   8008.00 TO NODE   8004.00 =    1026.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   8004.00 TO NODE   8004.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 PEAK FLOW RATE(CFS) =     1331.74    Tc(MIN.) =   40.36
 AREA-AVERAGED Fm(INCH/HR) =  0.22    Ybar = 0.25
 TOTAL AREA(ACRES) =     1030.7

 * SOURCE FLOW DATA: FLOW(CFS) =   524.00     AREA(ACRES) =   716.18
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   8004.00 =   17327.20 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       28.83   12.47    3.079  0.57( 0.11) 0.20      10.8    8008.00
 LONGEST FLOWPATH FROM NODE   8008.00 TO NODE   8004.00 =    1026.80 FEET.

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 UNIT-HYDROGRAPH DATA:
 RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
          MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
 Tc(HR) = 0.67; LAG(HR) = 0.54; Fm(INCH/HR) = 0.22; Ybar = 0.25
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
 DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00
 UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =     1041.5
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   8004.00 =   17327.20 FEET.
  EQUIVALENT BASIN FACTOR APPROXIMATIONS:
  Lca/L=0.3,n=.0295; Lca/L=0.4,n=.0265; Lca/L=0.5,n=.0243;Lca/L=0.6,n=.0227
```

Flows from P3 & P4


```
 TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =     400.54
 PEAK FLOW RATE(CFS) =    1328.80
   (UPSTREAM NODE PEAK FLOW RATE(CFS) =    1331.74)
 PEAK FLOW RATE(CFS) USED =    1331.74
 * CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =     524.00  AREA(AC.) =      716.2
 * SUMMED DATA: FLOW(CFS) =    1855.74    TOTAL AREA(ACRES) =     1757.7

****************************************************************************
 FLOW PROCESS FROM NODE   8004.00 TO NODE   8003.00 IS CODE =  48
----------------------------------------------------------------------------
 >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   664.60  DOWNSTREAM(FEET) =   662.70
 FLOW LENGTH(FEET) =   670.20   MANNING'S N =  0.014
 GIVEN BOX BASEWIDTH(FEET) =  16.00   GIVEN BOX HEIGHT(FEET) =  10.00
 *GIVEN BOX HEIGHT(FEET) =  10.00   ESTIMATED BOX BASEWIDTH(FEET) =   16.29
 ASSUME FULL-FLOWING BOX   BOX-FLOW VELOCITY(FEET/SEC.) =  11.39
 BOX-FLOW(CFS) =    1855.74
 BOX-FLOW TRAVEL TIME(MIN.) =   0.98    Tc(MIN.) =   41.34
 * TOTAL SOURCE FLOW(CFS) =     524.00
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   8003.00 =   17997.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   8003.00 TO NODE   8003.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   8003.00 TO NODE   8003.00 IS CODE = 15.1
----------------------------------------------------------------------------
 >>>>>DEFINE MEMORY BANK # 1 <<<<<
============================================================================
 PEAK FLOWRATE TABLE FILE NAME: np.DNA
 MEMORY BANK #  1 DEFINED AS FOLLOWS:
  STREAM       Q      Tc      Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS) (MIN.)  (INCH/HR)         (ACRES)    NODE
     1      117.16   13.65  0.82( 0.16) 0.20      47.3    8006.00
   TOTAL AREA(ACRES) =       47.3
 LONGEST FLOWPATH FROM NODE   8006.00 TO NODE   8003.00 =    2011.96 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   8003.00 TO NODE   8003.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 PEAK FLOW RATE(CFS) =     1331.74    Tc(MIN.) =   41.34
 AREA-AVERAGED Fm(INCH/HR) =  0.22    Ybar = 0.25
 TOTAL AREA(ACRES) =     1041.5

 * SOURCE FLOW DATA: FLOW(CFS) =   524.00     AREA(ACRES) =   716.18
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   8003.00 =   17997.40 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

Flows from N6, N7 & P1

```
      1      117.16   13.65    2.917  0.82( 0.16) 0.20      47.3    8006.00
  LONGEST FLOWPATH FROM NODE   8006.00 TO NODE   8003.00 =    2011.96 FEET.

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.69; LAG(HR) = 0.55; Fm(INCH/HR) = 0.22; Ybar = 0.24
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;
  3HR = 0.99; 6HR = 1.00; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =     1088.8
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   8003.00 =   17997.40 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0292; Lca/L=0.4,n=.0262; Lca/L=0.5,n=.0241;Lca/L=0.6,n=.0225
  TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =     419.79
  PEAK FLOW RATE(CFS) =    1365.06
  * CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =     524.00  AREA(AC.) =      716.2
  * SUMMED DATA: FLOW(CFS) =    1889.06    TOTAL AREA(ACRES) =     1805.0

****************************************************************************
  FLOW PROCESS FROM NODE   8003.00 TO NODE   4325.00 IS CODE =  48
----------------------------------------------------------------------------
  >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   662.70  DOWNSTREAM(FEET) =   658.70
  FLOW LENGTH(FEET) =  1442.10   MANNING'S N =  0.014
  GIVEN BOX BASEWIDTH(FEET) =  16.00   GIVEN BOX HEIGHT(FEET) =  10.00
  *GIVEN BOX HEIGHT(FEET) =  10.00   ESTIMATED BOX BASEWIDTH(FEET) =   16.67
  ASSUME FULL-FLOWING BOX   BOX-FLOW VELOCITY(FEET/SEC.) =  11.34
  BOX-FLOW(CFS) =    1889.06
  BOX-FLOW TRAVEL TIME(MIN.) =   2.12    Tc(MIN.) =   43.46
  * TOTAL SOURCE FLOW(CFS) =     524.00
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   4325.00 =   19439.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4325.00 TO NODE   4325.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   4325.00 TO NODE   4325.00 IS CODE = 15.1
----------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<          Haven SD
============================================================================
  PEAK FLOWRATE TABLE FILE NAME: PRHAVEN.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS) (MIN.)  (INCH/HR)         (ACRES)    NODE
      1      683.12   18.66  0.96( 0.35) 0.36     366.6    4175.00
      2      700.43   22.39  0.96( 0.35) 0.36     427.8    4210.00
      3      690.56   31.86  0.96( 0.36) 0.37     549.1    4020.00
      4      684.33   32.70  0.96( 0.36) 0.37     555.4       1.00
      5      684.05   32.72  0.96( 0.36) 0.37     555.5    4000.00
      6      676.74   33.26  0.96( 0.36) 0.37     556.6    4045.00
    TOTAL AREA(ACRES) =      556.6
```



```
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4325.00 =   15347.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4325.00 TO NODE   4325.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  PEAK FLOW RATE(CFS) =     1365.06    Tc(MIN.) =   43.46
  AREA-AVERAGED Fm(INCH/HR) =  0.22    Ybar = 0.24
  TOTAL AREA(ACRES) =     1088.8

  * SOURCE FLOW DATA: FLOW(CFS) =   524.00     AREA(ACRES) =   716.18
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   4325.00 =   19439.50 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      683.12   18.66    2.418  0.96( 0.35) 0.36     366.6    4175.00
      2      700.43   22.39    2.168  0.96( 0.35) 0.36     427.8    4210.00
      3      690.56   31.86    1.754  0.96( 0.36) 0.37     549.1    4020.00
      4      684.33   32.70    1.727  0.96( 0.36) 0.37     555.4       1.00
      5      684.05   32.72    1.727  0.96( 0.36) 0.37     555.5    4000.00
      6      676.74   33.26    1.710  0.96( 0.36) 0.37     556.6    4045.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4325.00 =   15347.70 FEET.

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.72; LAG(HR) = 0.58; Fm(INCH/HR) = 0.26; Ybar = 0.29
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.93; 30M = 0.93; 1HR = 0.93;
  3HR = 0.99; 6HR = 0.99; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =     1645.3
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   4325.00 =   19439.50 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0287; Lca/L=0.4,n=.0257; Lca/L=0.5,n=.0236;Lca/L=0.6,n=.0221
  TIME OF PEAK FLOW(HR) = 16.67  RUNOFF VOLUME(AF) =     596.73
  PEAK FLOW RATE(CFS) =    1864.50
  * CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =     524.00  AREA(AC.) =      716.2
  * SUMMED DATA: FLOW(CFS) =    2388.50    TOTAL AREA(ACRES) =     2361.5
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     1645.3  TC(MIN.) =     43.46
  AREA-AVERAGED Fm(INCH/HR)=  0.26   Ybar =  0.29
  PEAK FLOW RATE(CFS)   =   1864.50
  * CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =     524.00  AREA(AC.) =      716.2
  * SUMMED DATA: FLOW(CFS) =    2388.50    TOTAL AREA(ACRES) =     2361.5
============================================================================
============================================================================
  END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS
```

Consulting

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 ************************************************************************
           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2015 Advanced Engineering Software (aes)
            Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                        Analysis prepared by:
```

Haven Ave - Recreated 2012 MP Hydrology Tributary to MP Node 4280

```
  ************************** DESCRIPTION OF STUDY **************************
 * SUBAREA 29                                                             *
 * HAVEN AVE SD                                                           *
 * 2017 ONTARIO MP - TRIB TO MP NODE 4280                                 *
  ************************************************************************

  FILE NAME: MPHAVEN.DAT
  TIME/DATE OF STUDY: 11:27 04/22/2022
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

  *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 =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
```



```
  UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:
    WATERSHED LAG = 0.80 * Tc
    USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF
    2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH
    FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
    SIERRA MADRE DEPTH-AREA FACTORS USED.
                        AREA-AVERAGED
         DURATION    RAINFALL(INCH)
          5-MINUTES         0.44
         30-MINUTES         0.91
          1-HOUR            1.20
          3-HOUR            2.10
          6-HOUR            3.00
         24-HOUR            6.00
 *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD*


****************************************************************************
  FLOW PROCESS FROM NODE   4000.00 TO NODE   4005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   469.00
  ELEVATION DATA: UPSTREAM(FEET) =    790.50  DOWNSTREAM(FEET) =    787.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.594
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.062
  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.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        2.44      0.98     0.500    32   12.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      5.65
  TOTAL AREA(ACRES) =      2.44   PEAK FLOW RATE(CFS) =      5.65

****************************************************************************
  FLOW PROCESS FROM NODE   4005.00 TO NODE   4010.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  787.60  DOWNSTREAM ELEVATION(FEET) =  776.50
  STREET LENGTH(FEET) =   585.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
```

```
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.37
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.42
   HALFSTREET FLOOD WIDTH(FEET) =   14.57
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.68
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.55
 STREET FLOW TRAVEL TIME(MIN.) =   2.65   Tc(MIN.) =   15.25
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.730
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        9.60      0.98     0.500    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    9.60      SUBAREA RUNOFF(CFS) =   19.38
 EFFECTIVE AREA(ACRES) =     12.04    AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =       12.0        PEAK FLOW RATE(CFS) =      24.30

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.62
 FLOW VELOCITY(FEET/SEC.) =  4.10   DEPTH*VELOCITY(FT*FT/SEC.) =   1.96
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4010.00 =    1054.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4010.00 TO NODE   4015.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   770.50  DOWNSTREAM(FEET) =   766.00
 FLOW LENGTH(FEET) =   685.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.09
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      24.30
 PIPE TRAVEL TIME(MIN.) =   1.61    Tc(MIN.) =   16.86
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4015.00 =    1739.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4015.00 TO NODE   4015.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.86
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.570
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
```



```
 "5-7 DWELLINGS/ACRE"       A       11.46      0.98     0.500    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =   11.46      SUBAREA RUNOFF(CFS) =   21.48
 EFFECTIVE AREA(ACRES) =     23.50   AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =       23.5       PEAK FLOW RATE(CFS) =      44.05

****************************************************************************
 FLOW PROCESS FROM NODE   4015.00 TO NODE   4015.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.86
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.570
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        2.05      0.98     0.100    32
 PUBLIC PARK                A        1.09      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.360
 SUBAREA AREA(ACRES) =    3.14      SUBAREA RUNOFF(CFS) =    6.27
 EFFECTIVE AREA(ACRES) =     26.64   AREA-AVERAGED Fm(INCH/HR) =  0.47
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.48
 TOTAL AREA(ACRES) =       26.6       PEAK FLOW RATE(CFS) =      50.33

****************************************************************************
 FLOW PROCESS FROM NODE   4015.00 TO NODE   4016.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   766.00  DOWNSTREAM(FEET) =   761.50
 FLOW LENGTH(FEET) =   344.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.89
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      50.33
 PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   17.38
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4016.00 =    2083.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4016.00 TO NODE   4016.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.38
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.523
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.89      0.98     0.100    32
 PUBLIC PARK                A        1.26      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.540
 SUBAREA AREA(ACRES) =    2.15      SUBAREA RUNOFF(CFS) =    3.87
 EFFECTIVE AREA(ACRES) =     28.79   AREA-AVERAGED Fm(INCH/HR) =  0.48
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.49
 TOTAL AREA(ACRES) =       28.8       PEAK FLOW RATE(CFS) =      53.06

****************************************************************************
 FLOW PROCESS FROM NODE   4016.00 TO NODE   4025.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   761.50  DOWNSTREAM(FEET) =   761.30
 FLOW LENGTH(FEET) =   166.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.46
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      53.06
 PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   18.00
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4025.00 =    2249.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4025.00 TO NODE   4025.00 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.) =   18.00
 RAINFALL INTENSITY(INCH/HR) =   2.47
 AREA-AVERAGED Fm(INCH/HR) =  0.48
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.49
 EFFECTIVE STREAM AREA(ACRES) =      28.79
 TOTAL STREAM AREA(ACRES) =      28.79
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      53.06

****************************************************************************
 FLOW PROCESS FROM NODE   4020.00 TO NODE   4022.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   336.00
 ELEVATION DATA: UPSTREAM(FEET) =    776.00  DOWNSTREAM(FEET) =    774.30

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.473
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.238
 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.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        1.23      0.98     0.500    32   11.47
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
```



```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      3.04
 TOTAL AREA(ACRES) =      1.23   PEAK FLOW RATE(CFS) =      3.04

****************************************************************************
 FLOW PROCESS FROM NODE   4022.00 TO NODE   4025.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   768.32  DOWNSTREAM(FEET) =   761.30
 FLOW LENGTH(FEET) =  1317.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.86
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.04
 PIPE TRAVEL TIME(MIN.) =   5.68    Tc(MIN.) =   17.15
 LONGEST FLOWPATH FROM NODE   4020.00 TO NODE   4025.00 =    1653.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4025.00 TO NODE   4025.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.15
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.544
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A       12.42      0.98     0.500    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =   12.42      SUBAREA RUNOFF(CFS) =   22.98
 EFFECTIVE AREA(ACRES) =     13.65   AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =       13.6       PEAK FLOW RATE(CFS) =      25.26

****************************************************************************
 FLOW PROCESS FROM NODE   4025.00 TO NODE   4025.00 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.) =   17.15
 RAINFALL INTENSITY(INCH/HR) =   2.54
 AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =      13.65
 TOTAL STREAM AREA(ACRES) =      13.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.26
```

```
 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       53.06   18.00    2.471  0.98( 0.48) 0.49      28.8    4000.00
     2       25.26   17.15    2.544  0.98( 0.49) 0.50      13.6    4020.00

 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       77.66   17.15    2.544  0.98( 0.48) 0.49      41.1    4020.00
     2       77.43   18.00    2.471  0.97( 0.48) 0.49      42.4    4000.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      77.66    Tc(MIN.) =    17.15
 EFFECTIVE AREA(ACRES) =      41.08   AREA-AVERAGED Fm(INCH/HR) =  0.48
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.49
 TOTAL AREA(ACRES) =       42.4
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4025.00 =    2249.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4025.00 TO NODE   4026.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   761.30  DOWNSTREAM(FEET) =   745.80
 FLOW LENGTH(FEET) =  1141.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.36
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      77.66
 PIPE TRAVEL TIME(MIN.) =   1.54    Tc(MIN.) =   18.69
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4026.00 =    3390.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4026.00 TO NODE   4026.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.69
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.416
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        5.91      0.98     0.100    32
 PUBLIC PARK                A        2.01      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.290
 SUBAREA AREA(ACRES) =    7.92      SUBAREA RUNOFF(CFS) =   15.20
 EFFECTIVE AREA(ACRES) =     49.00   AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.46
```



```
 TOTAL AREA(ACRES) =       50.4       PEAK FLOW RATE(CFS) =      86.80

****************************************************************************
 FLOW PROCESS FROM NODE   4026.00 TO NODE   4070.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   745.80  DOWNSTREAM(FEET) =   744.50
 FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.24
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      86.80
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   18.89
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4070.00 =    3520.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4070.00 TO NODE   4070.00 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.) =   18.89
 RAINFALL INTENSITY(INCH/HR) =   2.40
 AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.46
 EFFECTIVE STREAM AREA(ACRES) =      49.00
 TOTAL STREAM AREA(ACRES) =      50.36
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      86.80

****************************************************************************
 FLOW PROCESS FROM NODE   4045.00 TO NODE   4050.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   444.00
 ELEVATION DATA: UPSTREAM(FEET) =    772.80  DOWNSTREAM(FEET) =    770.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.273
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.110
 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.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        4.70      0.98     0.500    32   12.27
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =     11.09
 TOTAL AREA(ACRES) =      4.70   PEAK FLOW RATE(CFS) =     11.09
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   4050.00 TO NODE   4055.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  770.00  DOWNSTREAM ELEVATION(FEET) =  767.40
  STREET LENGTH(FEET) =   517.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.51
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.55
    HALFSTREET FLOOD WIDTH(FEET) =   21.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.37
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.30
  STREET FLOW TRAVEL TIME(MIN.) =   3.64   Tc(MIN.) =   15.91
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.661
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        9.60      0.98     0.500    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    9.60      SUBAREA RUNOFF(CFS) =   18.78
  EFFECTIVE AREA(ACRES) =     14.30    AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       14.3        PEAK FLOW RATE(CFS) =      27.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =  24.34
  FLOW VELOCITY(FEET/SEC.) =  2.55   DEPTH*VELOCITY(FT*FT/SEC.) =   1.52
  LONGEST FLOWPATH FROM NODE   4045.00 TO NODE   4055.00 =     961.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4055.00 TO NODE   4060.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   750.70  DOWNSTREAM(FEET) =   749.60
  FLOW LENGTH(FEET) =   374.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.41
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
```



```
  PIPE-FLOW(CFS) =      27.97
  PIPE TRAVEL TIME(MIN.) =   1.15    Tc(MIN.) =   17.06
  LONGEST FLOWPATH FROM NODE   4045.00 TO NODE   4060.00 =    1335.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4060.00 TO NODE   4060.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.06
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.552
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.51      0.75     0.850    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        4.06      0.75     0.500    56
  PUBLIC PARK                A        2.28      0.98     0.850    32
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        4.93      0.98     0.500    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.89
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.583
  SUBAREA AREA(ACRES) =   11.78      SUBAREA RUNOFF(CFS) =   21.53
  EFFECTIVE AREA(ACRES) =     26.08   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =       26.1       PEAK FLOW RATE(CFS) =      48.10

****************************************************************************
  FLOW PROCESS FROM NODE   4060.00 TO NODE   4065.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   749.60  DOWNSTREAM(FEET) =   748.60
  FLOW LENGTH(FEET) =   540.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  35.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.09
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.10
  PIPE TRAVEL TIME(MIN.) =   1.77    Tc(MIN.) =   18.83
  LONGEST FLOWPATH FROM NODE   4045.00 TO NODE   4065.00 =    1875.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4065.00 TO NODE   4065.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.83
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.405
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.58      0.75     0.850    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        5.10      0.75     0.500    56
```

```
  PUBLIC PARK                A        0.74      0.98     0.850    32
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        4.07      0.98     0.500    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.544
  SUBAREA AREA(ACRES) =   10.49      SUBAREA RUNOFF(CFS) =   18.32
  EFFECTIVE AREA(ACRES) =     36.57   AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.91  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =       36.6       PEAK FLOW RATE(CFS) =      62.98

****************************************************************************
  FLOW PROCESS FROM NODE   4065.00 TO NODE   4066.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   748.60  DOWNSTREAM(FEET) =   745.00
  FLOW LENGTH(FEET) =   585.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.72
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.98
  PIPE TRAVEL TIME(MIN.) =   1.12    Tc(MIN.) =   19.95
  LONGEST FLOWPATH FROM NODE   4045.00 TO NODE   4066.00 =    2460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4066.00 TO NODE   4066.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.95
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.323
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                B        2.13      0.75     0.100    56
  COMMERCIAL                A        3.00      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.88
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.13      SUBAREA RUNOFF(CFS) =   10.32
  EFFECTIVE AREA(ACRES) =     41.70   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.91  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       41.7       PEAK FLOW RATE(CFS) =      70.61

****************************************************************************
  FLOW PROCESS FROM NODE   4066.00 TO NODE   4070.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   745.00  DOWNSTREAM(FEET) =   744.50
  FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.34
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
```



```
  PIPE-FLOW(CFS) =      70.61
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   20.24
  LONGEST FLOWPATH FROM NODE   4045.00 TO NODE   4070.00 =    2590.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4070.00 TO NODE   4070.00 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.) =   20.24
  RAINFALL INTENSITY(INCH/HR) =   2.30
  AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.91
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =      41.70
  TOTAL STREAM AREA(ACRES) =      41.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      70.61

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       86.80   18.89    2.401  0.98( 0.45) 0.46      49.0    4020.00
      1       86.28   19.74    2.338  0.97( 0.45) 0.46      50.4    4000.00
      2       70.61   20.24    2.303  0.91( 0.44) 0.49      41.7    4045.00

  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      156.14   18.89    2.401  0.95( 0.45) 0.47      87.9    4020.00
      2      156.43   19.74    2.338  0.95( 0.45) 0.47      91.0    4000.00
      3      155.28   20.24    2.303  0.95( 0.45) 0.47      92.1    4045.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     156.43    Tc(MIN.) =    19.74
  EFFECTIVE AREA(ACRES) =      91.02   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.95  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       92.1
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4070.00 =    3520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4070.00 TO NODE   4071.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   744.50  DOWNSTREAM(FEET) =   740.50
  FLOW LENGTH(FEET) =   566.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  44.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.24
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     156.43
 PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =   20.57
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4071.00 =    4086.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4071.00 TO NODE   4071.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.57
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.281
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.85      0.98     0.100    32
 PUBLIC PARK                A        1.45      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.573
 SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    3.56
 EFFECTIVE AREA(ACRES) =     93.32   AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.95  AREA-AVERAGED Ap =  0.47
 TOTAL AREA(ACRES) =       94.4       PEAK FLOW RATE(CFS) =     156.43
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   4071.00 TO NODE   4075.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   740.50  DOWNSTREAM(FEET) =   740.00
 FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  45.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.27
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     156.43
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   20.80
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4075.00 =    4211.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4075.00 TO NODE   4075.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.80
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.266
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        2.41      0.75     0.850    56
 PUBLIC PARK                A       12.00      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =   14.41      SUBAREA RUNOFF(CFS) =   19.06
```



```
 EFFECTIVE AREA(ACRES) =    107.73   AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =      108.8       PEAK FLOW RATE(CFS) =     171.70

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      172.01   19.95    2.323  0.94( 0.50) 0.53     104.6    4020.00
     2      171.70   20.80    2.266  0.94( 0.49) 0.52     107.7    4000.00
     3      170.20   21.31    2.233  0.94( 0.49) 0.52     108.8    4045.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     172.01  Tc(MIN.) =   19.95
 AREA-AVERAGED Fm(INCH/HR) =  0.50  AREA-AVERAGED Fp(INCH/HR) =  0.94
 AREA-AVERAGED Ap =  0.53  EFFECTIVE AREA(ACRES) =     104.62

****************************************************************************
 FLOW PROCESS FROM NODE   4075.00 TO NODE   4076.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   740.00  DOWNSTREAM(FEET) =   729.80
 FLOW LENGTH(FEET) =   855.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  41.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.06
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     172.01
 PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =   20.97
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4076.00 =    5066.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4076.00 TO NODE   4076.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.97
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.255
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        1.75      0.98     0.100    32
 PUBLIC PARK                A        2.82      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.563
 SUBAREA AREA(ACRES) =    4.57      SUBAREA RUNOFF(CFS) =    7.02
 EFFECTIVE AREA(ACRES) =    109.19   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.95  AREA-AVERAGED Ap =  0.53
 TOTAL AREA(ACRES) =      113.3       PEAK FLOW RATE(CFS) =     172.62

****************************************************************************
 FLOW PROCESS FROM NODE   4076.00 TO NODE   4120.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   729.80  DOWNSTREAM(FEET) =   729.30
 FLOW LENGTH(FEET) =   176.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  51.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.33
 ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     172.62
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   21.32
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4120.00 =    5242.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4120.00 TO NODE   4120.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   425.00
 ELEVATION DATA: UPSTREAM(FEET) =    795.00  DOWNSTREAM(FEET) =    790.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.276
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.272
 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.)
 SCHOOL                     A        4.60      0.98     0.600    32   11.28
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 SUBAREA RUNOFF(CFS) =     11.12
 TOTAL AREA(ACRES) =      4.60   PEAK FLOW RATE(CFS) =     11.12

****************************************************************************
 FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    790.00  DOWNSTREAM(FEET) =    785.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =  0.0125
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.069
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                     A        4.50      0.98     0.600    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.15
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.25
```



```
 AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   1.27
 Tc(MIN.) =   12.54
 SUBAREA AREA(ACRES) =     4.50       SUBAREA RUNOFF(CFS) =   10.06
 EFFECTIVE AREA(ACRES) =      9.10     AREA-AVERAGED Fm(INCH/HR) =   0.58
 AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.60
 TOTAL AREA(ACRES) =        9.1         PEAK FLOW RATE(CFS) =      20.34

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.49   FLOW VELOCITY(FEET/SEC.) =   5.64
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     825.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE   4039.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    785.00  DOWNSTREAM(FEET) =    762.36
 CHANNEL LENGTH THRU SUBAREA(FEET) =   900.00   CHANNEL SLOPE =  0.0252
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.853
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                     A       26.30      0.98     0.600    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      47.21
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.23
 AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   1.63
 Tc(MIN.) =   14.17
 SUBAREA AREA(ACRES) =    26.30       SUBAREA RUNOFF(CFS) =   53.67
 EFFECTIVE AREA(ACRES) =     35.40     AREA-AVERAGED Fm(INCH/HR) =   0.59
 AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.60
 TOTAL AREA(ACRES) =       35.4         PEAK FLOW RATE(CFS) =      72.25

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.78   FLOW VELOCITY(FEET/SEC.) =  10.39
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4039.00 =    1725.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4039.00 TO NODE   4039.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.17
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.853
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 MOBILE HOME PARK           A        6.30      0.98     0.250    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.250
 SUBAREA AREA(ACRES) =    6.30      SUBAREA RUNOFF(CFS) =   14.79
```

```
  EFFECTIVE AREA(ACRES) =     41.70   AREA-AVERAGED Fm(INCH/HR) =  0.53
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =       41.7       PEAK FLOW RATE(CFS) =      87.04

****************************************************************************
  FLOW PROCESS FROM NODE   4039.00 TO NODE   4040.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   762.36  DOWNSTREAM(FEET) =   760.10
  FLOW LENGTH(FEET) =   987.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.40
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      87.04
  PIPE TRAVEL TIME(MIN.) =   2.57    Tc(MIN.) =   16.74
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4040.00 =    2712.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4040.00 TO NODE   4040.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.581
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       12.63      0.98     0.500    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.63      SUBAREA RUNOFF(CFS) =   23.80
  EFFECTIVE AREA(ACRES) =     54.33   AREA-AVERAGED Fm(INCH/HR) =  0.52
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =       54.3       PEAK FLOW RATE(CFS) =     100.64

****************************************************************************
  FLOW PROCESS FROM NODE   4040.00 TO NODE   4080.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   760.10  DOWNSTREAM(FEET) =   749.00
  FLOW LENGTH(FEET) =   407.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.84
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     100.64
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   17.14
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4080.00 =    3119.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4080.00 TO NODE   4080.00 IS CODE =  81
```



```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.544
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       10.57      0.98     0.500    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   10.57      SUBAREA RUNOFF(CFS) =   19.57
  EFFECTIVE AREA(ACRES) =     64.90   AREA-AVERAGED Fm(INCH/HR) =  0.52
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =       64.9       PEAK FLOW RATE(CFS) =     118.42

****************************************************************************
  FLOW PROCESS FROM NODE   4080.00 TO NODE   4082.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   749.00  DOWNSTREAM(FEET) =   748.50
  FLOW LENGTH(FEET) =   345.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  52.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.82
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     118.42
  PIPE TRAVEL TIME(MIN.) =   0.99    Tc(MIN.) =   18.13
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4082.00 =    3464.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4082.00 TO NODE   4082.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.13
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.460
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.87      0.98     0.100    32
  PUBLIC PARK                A        1.27      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.403
  SUBAREA AREA(ACRES) =    3.14      SUBAREA RUNOFF(CFS) =    5.84
  EFFECTIVE AREA(ACRES) =     68.04   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       68.0       PEAK FLOW RATE(CFS) =     119.35

****************************************************************************
  FLOW PROCESS FROM NODE   4082.00 TO NODE   4120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   748.50  DOWNSTREAM(FEET) =   729.30
  FLOW LENGTH(FEET) =  2619.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.89
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     119.35
  PIPE TRAVEL TIME(MIN.) =   4.01    Tc(MIN.) =   22.14
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4120.00 =    6083.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4120.00 TO NODE   4120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.182
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       11.55      0.98     0.200    32
  PUBLIC PARK                A       10.51      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.510
  SUBAREA AREA(ACRES) =   22.06      SUBAREA RUNOFF(CFS) =   33.47
  EFFECTIVE AREA(ACRES) =     90.10   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       90.1       PEAK FLOW RATE(CFS) =     135.80

****************************************************************************
  FLOW PROCESS FROM NODE   4120.00 TO NODE   4120.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      135.80   22.14    2.182  0.98( 0.51) 0.52      90.1       1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4120.00 =    6083.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      172.62   21.32    2.233  0.95( 0.50) 0.53     109.2    4020.00
      2      172.32   22.17    2.181  0.95( 0.50) 0.53     112.3    4000.00
      3      170.86   22.68    2.151  0.95( 0.50) 0.53     113.3    4045.00
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4120.00 =    5242.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      307.30   21.32    2.233  0.96( 0.50) 0.52     195.9    4020.00
```



```
      2      308.13   22.14    2.182  0.96( 0.50) 0.52     202.3       1.00
      3      308.00   22.17    2.181  0.96( 0.50) 0.52     202.4    4000.00
      4      304.14   22.68    2.151  0.96( 0.50) 0.52     203.4    4045.00
    TOTAL AREA(ACRES) =       203.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      308.13  Tc(MIN.) =   22.141
  EFFECTIVE AREA(ACRES) =    202.31  AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =      203.4
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4120.00 =    6083.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4120.00 TO NODE   4120.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   4120.00 TO NODE   4125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   729.30  DOWNSTREAM(FEET) =   720.30
  FLOW LENGTH(FEET) =   790.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  49.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.21
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     308.13
  PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =   22.95
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4125.00 =    6873.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4125.00 TO NODE   4125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.95
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.136
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       16.30      0.98     0.200    32
  PUBLIC PARK                A        3.36      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.311
  SUBAREA AREA(ACRES) =   19.66      SUBAREA RUNOFF(CFS) =   32.42
  EFFECTIVE AREA(ACRES) =    221.97   AREA-AVERAGED Fm(INCH/HR) =  0.48
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =      223.1       PEAK FLOW RATE(CFS) =     329.92

****************************************************************************
  FLOW PROCESS FROM NODE   4125.00 TO NODE   4126.00 IS CODE =  31
```

```
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.30  DOWNSTREAM(FEET) =   714.40
  FLOW LENGTH(FEET) =   683.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  55.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.63
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     329.92
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   23.73
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4126.00 =    7556.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4126.00 TO NODE   4126.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   23.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.094
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.69      0.98     0.100    32
  PUBLIC PARK                A        4.25      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.559
  SUBAREA AREA(ACRES) =    6.94      SUBAREA RUNOFF(CFS) =    9.67
  EFFECTIVE AREA(ACRES) =    228.91   AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =      230.0       PEAK FLOW RATE(CFS) =     331.15

****************************************************************************
  FLOW PROCESS FROM NODE   4126.00 TO NODE   4145.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   714.40  DOWNSTREAM(FEET) =   713.90
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  62.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.27
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     331.15
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   23.91
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4145.00 =    7676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4145.00 TO NODE   4145.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   23.91
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.084
  SUBAREA LOSS RATE DATA(AMC  II):
```



```
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       26.70      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   26.70      SUBAREA RUNOFF(CFS) =   47.74
  EFFECTIVE AREA(ACRES) =    255.61   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =      256.7       PEAK FLOW RATE(CFS) =     376.96

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      377.70   23.09    2.128  0.96( 0.44) 0.46     249.2    4020.00
      2      376.96   23.91    2.084  0.96( 0.45) 0.46     255.6       1.00
      3      376.80   23.93    2.083  0.96( 0.45) 0.46     255.7    4000.00
      4      372.25   24.45    2.057  0.96( 0.45) 0.46     256.7    4045.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     377.70  Tc(MIN.) =   23.09
  AREA-AVERAGED Fm(INCH/HR) =  0.44  AREA-AVERAGED Fp(INCH/HR) =  0.96
  AREA-AVERAGED Ap =  0.46  EFFECTIVE AREA(ACRES) =     249.24

****************************************************************************
  FLOW PROCESS FROM NODE   4145.00 TO NODE   4145.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   23.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.128
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        2.09      0.98     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    3.64
  EFFECTIVE AREA(ACRES) =    251.33   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =      258.8       PEAK FLOW RATE(CFS) =     381.34

****************************************************************************
  FLOW PROCESS FROM NODE   4145.00 TO NODE   4146.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.90  DOWNSTREAM(FEET) =   712.50
  FLOW LENGTH(FEET) =   551.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  72.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.67
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     381.34
  PIPE TRAVEL TIME(MIN.) =   0.95    Tc(MIN.) =   24.04
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4146.00 =    8227.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   4146.00 TO NODE   4146.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.04
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.077
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.06      0.98     0.100    32
  PUBLIC PARK                A        1.62      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.553
  SUBAREA AREA(ACRES) =    2.68      SUBAREA RUNOFF(CFS) =    3.71
  EFFECTIVE AREA(ACRES) =    254.01   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =      261.5       PEAK FLOW RATE(CFS) =     381.34
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   4146.00 TO NODE   4170.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   712.50  DOWNSTREAM(FEET) =   711.41
  FLOW LENGTH(FEET) =   128.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  56.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.29
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     381.34
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   24.18
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4170.00 =    8355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4170.00 TO NODE   4170.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.18
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.070
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        6.26      0.98     0.100    32
  PUBLIC PARK                A        4.13      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.398
  SUBAREA AREA(ACRES) =   10.39      SUBAREA RUNOFF(CFS) =   15.73
  EFFECTIVE AREA(ACRES) =    264.40   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =      271.9       PEAK FLOW RATE(CFS) =     387.63
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   4170.00 TO NODE   4170.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.18
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.070
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       19.56      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   19.56      SUBAREA RUNOFF(CFS) =   34.73
  EFFECTIVE AREA(ACRES) =    283.96   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.43
  TOTAL AREA(ACRES) =      291.5       PEAK FLOW RATE(CFS) =     422.35

****************************************************************************
  FLOW PROCESS FROM NODE   4170.00 TO NODE   4171.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   711.41  DOWNSTREAM(FEET) =   700.00
  FLOW LENGTH(FEET) =  1251.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  60.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.90
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     422.35
  PIPE TRAVEL TIME(MIN.) =   1.31    Tc(MIN.) =   25.49
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4171.00 =    9606.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4171.00 TO NODE   4171.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.49
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.006
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        3.47      0.98     0.100    32
  PUBLIC PARK                A        3.36      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.469
  SUBAREA AREA(ACRES) =    6.83      SUBAREA RUNOFF(CFS) =    9.52
  EFFECTIVE AREA(ACRES) =    290.79   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =      298.3       PEAK FLOW RATE(CFS) =     422.35
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   4171.00 TO NODE   4171.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   25.49
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.006
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       35.70      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   35.70      SUBAREA RUNOFF(CFS) =   61.31
  EFFECTIVE AREA(ACRES) =    326.49   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =      334.0       PEAK FLOW RATE(CFS) =     476.68

************************************************************************
  FLOW PROCESS FROM NODE   4171.00 TO NODE   4200.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.50
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  96.0 INCH PIPE IS  74.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.38
  ESTIMATED PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     476.68
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   25.71
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4200.00 =    9754.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE   4200.00 TO NODE   4200.00 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.) =   25.71
  RAINFALL INTENSITY(INCH/HR) =   2.00
  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.96
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =     326.49
  TOTAL STREAM AREA(ACRES) =     333.99
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     476.68

************************************************************************
  FLOW PROCESS FROM NODE   4175.00 TO NODE   4180.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   561.00
  ELEVATION DATA: UPSTREAM(FEET) =    723.50  DOWNSTREAM(FEET) =    720.00
```



```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.249
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.276
  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.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        6.59      0.98     0.200    32   11.25
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     18.28
  TOTAL AREA(ACRES) =      6.59   PEAK FLOW RATE(CFS) =     18.28

************************************************************************
  FLOW PROCESS FROM NODE   4180.00 TO NODE   4200.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   699.00
  FLOW LENGTH(FEET) =   770.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.37
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.28
  PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =   12.38
  LONGEST FLOWPATH FROM NODE   4175.00 TO NODE   4200.00 =    1331.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE   4200.00 TO NODE   4200.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   12.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.094
  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        1.10      0.98     0.850    32
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        5.15      0.98     0.500    32
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        5.38      0.98     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.394
  SUBAREA AREA(ACRES) =   11.63      SUBAREA RUNOFF(CFS) =   28.36
  EFFECTIVE AREA(ACRES) =     18.22   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =       18.2       PEAK FLOW RATE(CFS) =      45.55

************************************************************************
  FLOW PROCESS FROM NODE   4200.00 TO NODE   4200.00 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.) =   12.38
  RAINFALL INTENSITY(INCH/HR) =   3.09
  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.32
  EFFECTIVE STREAM AREA(ACRES) =      18.22
  TOTAL STREAM AREA(ACRES) =      18.22
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      45.55

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      476.68   25.71    1.996  0.96( 0.38) 0.40     326.5    4020.00
      1      474.07   26.53    1.958  0.96( 0.39) 0.40     332.9       1.00
      1      473.86   26.55    1.957  0.96( 0.39) 0.40     332.9    4000.00
      1      468.46   27.07    1.935  0.96( 0.39) 0.40     334.0    4045.00
      2       45.55   12.38    3.094  0.97( 0.32) 0.32      18.2    4175.00

  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      431.45   12.38    3.094  0.96( 0.38) 0.39     175.4    4175.00
      2      504.22   25.71    1.996  0.96( 0.38) 0.39     344.7    4020.00
      3      501.00   26.53    1.958  0.96( 0.38) 0.40     351.1       1.00
      4      500.78   26.55    1.957  0.96( 0.38) 0.40     351.2    4000.00
      5      495.00   27.07    1.935  0.96( 0.38) 0.40     352.2    4045.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     504.22    Tc(MIN.) =    25.71
  EFFECTIVE AREA(ACRES) =     344.71   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =      352.2
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4200.00 =    9754.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4200.00 TO NODE   4205.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   697.00
  FLOW LENGTH(FEET) =   499.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  96.0 INCH PIPE IS  72.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.37
  ESTIMATED PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     504.22
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   26.38
```



```
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4205.00 =   10253.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4205.00 TO NODE   4205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.965
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        7.04      0.98     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    7.04      SUBAREA RUNOFF(CFS) =   11.21
  EFFECTIVE AREA(ACRES) =    351.75   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =      359.3       PEAK FLOW RATE(CFS) =     504.22
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   4205.00 TO NODE   4205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.965
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.80      0.98     0.100    32
  PUBLIC PARK                A        1.36      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.572
  SUBAREA AREA(ACRES) =    2.16      SUBAREA RUNOFF(CFS) =    2.74
  EFFECTIVE AREA(ACRES) =    353.91   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =      361.4       PEAK FLOW RATE(CFS) =     505.66

****************************************************************************
  FLOW PROCESS FROM NODE   4205.00 TO NODE   4206.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   697.00  DOWNSTREAM(FEET) =   692.50
  FLOW LENGTH(FEET) =  1132.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  96.0 INCH PIPE IS  73.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.32
  ESTIMATED PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     505.66
  PIPE TRAVEL TIME(MIN.) =   1.53    Tc(MIN.) =   27.91
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4206.00 =   11385.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   4206.00 TO NODE   4206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.91
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.899
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.30      0.98     0.100    32
  PUBLIC PARK                A        2.16      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.568
  SUBAREA AREA(ACRES) =    3.46      SUBAREA RUNOFF(CFS) =    4.19
  EFFECTIVE AREA(ACRES) =    357.37   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =      364.9       PEAK FLOW RATE(CFS) =     505.66
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   4206.00 TO NODE   4235.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.50  DOWNSTREAM(FEET) =   692.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  83.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.22
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     505.66
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   28.23
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4235.00 =   11585.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4235.00 TO NODE   4235.00 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.) =   28.23
  RAINFALL INTENSITY(INCH/HR) =   1.89
  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.96
  AREA-AVERAGED Ap =  0.39
  EFFECTIVE STREAM AREA(ACRES) =     357.37
  TOTAL STREAM AREA(ACRES) =     364.87
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     505.66

****************************************************************************
  FLOW PROCESS FROM NODE   4210.00 TO NODE   4215.00 IS CODE =  21
----------------------------------------------------------------------------
```



```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   945.00
  ELEVATION DATA: UPSTREAM(FEET) =    721.00  DOWNSTREAM(FEET) =    711.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.887
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.664
  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.)
  SCHOOL                     A        9.77      0.98     0.600    32   15.89
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =     18.28
  TOTAL AREA(ACRES) =      9.77   PEAK FLOW RATE(CFS) =     18.28

****************************************************************************
  FLOW PROCESS FROM NODE   4215.00 TO NODE   4235.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   702.50  DOWNSTREAM(FEET) =   692.00
  FLOW LENGTH(FEET) =  1233.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.15
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.28
  PIPE TRAVEL TIME(MIN.) =   2.87    Tc(MIN.) =   18.76
  LONGEST FLOWPATH FROM NODE   4210.00 TO NODE   4235.00 =    2178.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4235.00 TO NODE   4235.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.411
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     A        1.82      0.98     0.600    32
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       19.00      0.98     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.235
  SUBAREA AREA(ACRES) =   20.82      SUBAREA RUNOFF(CFS) =   40.88
  EFFECTIVE AREA(ACRES) =     30.59   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       30.6       PEAK FLOW RATE(CFS) =      56.93

****************************************************************************
  FLOW PROCESS FROM NODE   4235.00 TO NODE   4235.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.411
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       35.18      0.98     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   35.18      SUBAREA RUNOFF(CFS) =   70.15
  EFFECTIVE AREA(ACRES) =     65.77   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =       65.8       PEAK FLOW RATE(CFS) =     127.09

****************************************************************************
  FLOW PROCESS FROM NODE   4235.00 TO NODE   4235.00 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.) =   18.76
  RAINFALL INTENSITY(INCH/HR) =   2.41
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.27
  EFFECTIVE STREAM AREA(ACRES) =      65.77
  TOTAL STREAM AREA(ACRES) =      65.77
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     127.09

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      435.62   15.00    2.756  0.96( 0.38) 0.39     188.1    4175.00
      1      505.66   28.23    1.886  0.96( 0.38) 0.39     357.4    4020.00
      1      502.38   29.07    1.854  0.96( 0.38) 0.40     363.7       1.00
      1      502.16   29.09    1.853  0.96( 0.38) 0.40     363.8    4000.00
      1      496.53   29.63    1.832  0.96( 0.38) 0.40     364.9    4045.00
      2      127.09   18.76    2.411  0.98( 0.26) 0.27      65.8    4210.00

  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      553.63   15.00    2.756  0.97( 0.35) 0.36     240.7    4175.00
      2      582.58   18.76    2.411  0.97( 0.35) 0.36     301.9    4210.00
      3      601.70   28.23    1.886  0.96( 0.36) 0.37     423.1    4020.00
      4      596.49   29.07    1.854  0.96( 0.36) 0.38     429.5       1.00
      5      596.22   29.09    1.853  0.96( 0.36) 0.38     429.6    4000.00
```



```
      6      589.38   29.63    1.832  0.96( 0.36) 0.38     430.6    4045.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     601.70    Tc(MIN.) =    28.23
  EFFECTIVE AREA(ACRES) =     423.14   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =      430.6
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4235.00 =   11585.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4235.00 TO NODE   4236.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.00  DOWNSTREAM(FEET) =   684.00
  FLOW LENGTH(FEET) =  1134.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  90.0 INCH PIPE IS  72.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.79
  ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     601.70
  PIPE TRAVEL TIME(MIN.) =   1.20    Tc(MIN.) =   29.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4236.00 =   12719.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4236.00 TO NODE   4236.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.840
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        6.25      0.98     0.100    32
  PUBLIC PARK                A        0.85      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.190
  SUBAREA AREA(ACRES) =    7.10      SUBAREA RUNOFF(CFS) =   10.57
  EFFECTIVE AREA(ACRES) =    430.24   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =      437.7       PEAK FLOW RATE(CFS) =     601.70
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   4236.00 TO NODE   4236.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.840
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  "11+ DWELLINGS/ACRE"       A       19.00      0.98     0.200    32
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C       16.49      0.57     0.200    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   35.49      SUBAREA RUNOFF(CFS) =   53.75
  EFFECTIVE AREA(ACRES) =    465.73   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =      473.2       PEAK FLOW RATE(CFS) =     627.47

****************************************************************************
  FLOW PROCESS FROM NODE   4236.00 TO NODE   4280.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   684.00  DOWNSTREAM(FEET) =   683.30
  FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  96.0 INCH PIPE IS  77.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.40
  ESTIMATED PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     627.47
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   29.58
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4280.00 =   12849.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4280.00 TO NODE   4280.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.58
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.834
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        2.50      0.98     0.200    32
  PUBLIC PARK                A       32.54      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.804
  SUBAREA AREA(ACRES) =   35.04      SUBAREA RUNOFF(CFS) =   33.13
  EFFECTIVE AREA(ACRES) =    500.77   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =      508.3       PEAK FLOW RATE(CFS) =     658.24

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      642.33   16.38    2.615  0.96( 0.37) 0.39     318.3    4175.00
      2      663.37   20.11    2.312  0.96( 0.37) 0.39     379.5    4210.00
      3      658.24   29.58    1.834  0.96( 0.37) 0.39     500.8    4020.00
      4      652.13   30.42    1.804  0.96( 0.38) 0.39     507.1       1.00
      5      651.85   30.44    1.803  0.96( 0.38) 0.39     507.2    4000.00
      6      644.43   30.98    1.784  0.96( 0.38) 0.39     508.3    4045.00
  NEW PEAK FLOW DATA ARE:
```



```
  PEAK FLOW RATE(CFS) =     663.37  Tc(MIN.) =   20.11
  AREA-AVERAGED Fm(INCH/HR) =  0.37  AREA-AVERAGED Fp(INCH/HR) =  0.96
  AREA-AVERAGED Ap =  0.39  EFFECTIVE AREA(ACRES) =     379.54
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      508.3  TC(MIN.) =     20.11
  EFFECTIVE AREA(ACRES) =    379.54  AREA-AVERAGED Fm(INCH/HR)=  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap = 0.386
  PEAK FLOW RATE(CFS)   =     663.37

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      642.33   16.38    2.615  0.96( 0.37) 0.39     318.3    4175.00
      2      663.37   20.11    2.312  0.96( 0.37) 0.39     379.5    4210.00
      3      658.24   29.58    1.834  0.96( 0.37) 0.39     500.8    4020.00
      4      652.13   30.42    1.804  0.96( 0.38) 0.39     507.1       1.00
      5      651.85   30.44    1.803  0.96( 0.38) 0.39     507.2    4000.00
      6      644.43   30.98    1.784  0.96( 0.38) 0.39     508.3    4045.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Q3 Consulting

```
**************************************************************************
                RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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                Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                                Analysis prepared by:
```

Haven Ave - Proposed Condition

```
 ************************* DESCRIPTION OF STUDY *************************
* SUBAREA 29                                                            *
* HAVEN AVE SD                                                          *
* PROPOSED CONDITION 100YR                                              *
 ************************************************************************

 FILE NAME: PRHAVEN.DAT
 TIME/DATE OF STUDY: 12:38 04/22/2022
==========================================================================
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

 USER SPECIFIED STORM EVENT(YEAR) =  100.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

 SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
 USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

 *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 =  0.50 FEET
      as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
   2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
 *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
  OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
 *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
```



```
 UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:
   WATERSHED LAG = 0.80 * Tc
   USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF
   2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH
   FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
   SIERRA MADRE DEPTH-AREA FACTORS USED.
                     AREA-AVERAGED
        DURATION    RAINFALL(INCH)
         5-MINUTES         0.44
        30-MINUTES         0.91
         1-HOUR            1.20
         3-HOUR            2.10
         6-HOUR            3.00
        24-HOUR            6.00
 *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD*


**************************************************************************
 FLOW PROCESS FROM NODE   4280.00 TO NODE   4280.00 IS CODE = 15.1
--------------------------------------------------------------------------
 >>>>>DEFINE MEMORY BANK # 1 <<<<<
==========================================================================
 PEAK FLOWRATE TABLE FILE NAME: MPHAVEN.DNA
 MEMORY BANK #  1 DEFINED AS FOLLOWS:
  STREAM       Q      Tc      Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS) (MIN.)  (INCH/HR)          (ACRES)    NODE
     1      642.33   16.38  0.96( 0.37) 0.39     318.3    4175.00
     2      663.37   20.11  0.96( 0.37) 0.39     379.5    4210.00
     3      658.24   29.58  0.96( 0.37) 0.39     500.8    4020.00
     4      652.13   30.42  0.96( 0.38) 0.39     507.1       1.00
     5      651.85   30.44  0.96( 0.38) 0.39     507.2    4000.00
     6      644.43   30.98  0.96( 0.38) 0.39     508.3    4045.00
   TOTAL AREA(ACRES) =      508.3
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4280.00 =   12849.00 FEET.
```

MP Node 4280 per 2012 MP

```
**************************************************************************
 FLOW PROCESS FROM NODE   4280.00 TO NODE   4280.00 IS CODE = 14.0
--------------------------------------------------------------------------
 >>>>>MEMORY BANK #  1 COPIED ONTO MAIN-STREAM MEMORY<<<<<
==========================================================================

 MAIN-STREAM MEMORY DEFINED AS FOLLOWS:
  STREAM       Q      Tc      Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.)  (INCH/HR)          (ACRES)    NODE
     1      642.33   16.38  0.96( 0.37) 0.39     318.3    4175.00
     2      663.37   20.11  0.96( 0.37) 0.39     379.5    4210.00
     3      658.24   29.58  0.96( 0.37) 0.39     500.8    4020.00
     4      652.13   30.42  0.96( 0.38) 0.39     507.1       1.00
     5      651.85   30.44  0.96( 0.38) 0.39     507.2    4000.00
     6      644.43   30.98  0.96( 0.38) 0.39     508.3    4045.00
   TOTAL AREA(ACRES) =      508.3
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4280.00 =   12849.00 FEET.

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

```
 FLOW PROCESS FROM NODE   4280.00 TO NODE   8000.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   683.30  DOWNSTREAM(FEET) =   676.50
 FLOW LENGTH(FEET) =   812.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  90.0 INCH PIPE IS  73.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.20
 ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     663.37
 PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   20.90
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE   8000.00 =   13661.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   8000.00 TO NODE   8000.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.90
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.260
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 A       12.00      0.98     0.200    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =   12.00      SUBAREA RUNOFF(CFS) =   22.30
 EFFECTIVE AREA(ACRES) =    391.54   AREA-AVERAGED Fm(INCH/HR) =  0.36
 AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.38
 TOTAL AREA(ACRES) =      520.3       PEAK FLOW RATE(CFS) =     667.69

****************************************************************************
 FLOW PROCESS FROM NODE   8000.00 TO NODE   4300.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   676.50  DOWNSTREAM(FEET) =   672.00
 FLOW LENGTH(FEET) =   527.40   MANNING'S N =  0.013
 DEPTH OF FLOW IN  90.0 INCH PIPE IS  73.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.36
 ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     667.69
 PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   21.40
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4300.00 =   14188.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4300.00 TO NODE   8001.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   672.00  DOWNSTREAM(FEET) =   669.30
 FLOW LENGTH(FEET) =   253.00   MANNING'S N =  0.013
```

N1


```
 DEPTH OF FLOW IN  87.0 INCH PIPE IS  69.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.98
 ESTIMATED PIPE DIAMETER(INCH) =  87.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     667.69
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   21.62
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE   8001.00 =   14441.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   8001.00 TO NODE   8001.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   21.62
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.214
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 A       11.00      0.98     0.200    32
 COMMERCIAL                 A        3.30      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.177
 SUBAREA AREA(ACRES) =   14.30      SUBAREA RUNOFF(CFS) =   26.27
 EFFECTIVE AREA(ACRES) =    405.84   AREA-AVERAGED Fm(INCH/HR) =  0.36
 AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.37
 TOTAL AREA(ACRES) =      534.6       PEAK FLOW RATE(CFS) =     677.76

****************************************************************************
 FLOW PROCESS FROM NODE   8001.00 TO NODE   4325.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   669.30  DOWNSTREAM(FEET) =   658.70
 FLOW LENGTH(FEET) =   906.30   MANNING'S N =  0.013
 DEPTH OF FLOW IN  87.0 INCH PIPE IS  67.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.83
 ESTIMATED PIPE DIAMETER(INCH) =  87.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     677.76
 PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =   22.39
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4325.00 =   15347.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4325.00 TO NODE   4325.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.39
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.168
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 A       19.30      0.98     0.200    32
 APARTMENTS                 C        0.70      0.57     0.200    69
 COMMERCIAL                 A        2.00      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.96
```

N2, N3

N4, N5

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.191
  SUBAREA AREA(ACRES) =   22.00      SUBAREA RUNOFF(CFS) =   39.30
  EFFECTIVE AREA(ACRES) =    427.84   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =      556.6       PEAK FLOW RATE(CFS) =     700.43
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      556.6  TC(MIN.) =     22.39
  EFFECTIVE AREA(ACRES) =    427.84  AREA-AVERAGED Fm(INCH/HR)=  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap = 0.364
  PEAK FLOW RATE(CFS)   =     700.43

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      683.12   18.66    2.418  0.96( 0.35) 0.36     366.6    4175.00
      2      700.43   22.39    2.168  0.96( 0.35) 0.36     427.8    4210.00
      3      690.56   31.86    1.754  0.96( 0.36) 0.37     549.1    4020.00
      4      684.33   32.70    1.727  0.96( 0.36) 0.37     555.4       1.00
      5      684.05   32.72    1.727  0.96( 0.36) 0.37     555.5    4000.00
      6      676.74   33.26    1.710  0.96( 0.36) 0.37     556.6    4045.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Q3 Consulting

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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            Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

Mill Creek - Recreated 2012 MP Hydrology Tributary to MP Node 5425

```
 ************************* DESCRIPTION OF STUDY *************************
* SUBAREA 29                                                            *
* MILL CREEK SD                                                         *
* 2017 ONTARIO MP - TRIB TO MP NODE 5425                                *
 ************************************************************************

  FILE NAME: MPMCRK.DAT
  TIME/DATE OF STUDY: 10:52 04/22/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

  *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   18.0     12.0    0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

  UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:
```



```
  WATERSHED LAG = 0.80 * Tc
  USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF
  2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH
  FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
  SIERRA MADRE DEPTH-AREA FACTORS USED.
                    AREA-AVERAGED
       DURATION    RAINFALL(INCH)
        5-MINUTES         0.44
       30-MINUTES         0.91
        1-HOUR            1.20
        3-HOUR            2.10
        6-HOUR            3.00
       24-HOUR            6.00
 *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD*


**************************************************************************
  FLOW PROCESS FROM NODE   5000.00 TO NODE   5002.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   900.00
  ELEVATION DATA: UPSTREAM(FEET) =    810.00  DOWNSTREAM(FEET) =    806.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.646
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.918
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        3.75      0.98     0.100    32   13.65
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      9.52
  TOTAL AREA(ACRES) =      3.75   PEAK FLOW RATE(CFS) =      9.52

**************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5004.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  806.00  DOWNSTREAM ELEVATION(FEET) =  804.00
  STREET LENGTH(FEET) =   700.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

```
   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.85
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.60
   HALFSTREET FLOOD WIDTH(FEET) =   18.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.19
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.33
 STREET FLOW TRAVEL TIME(MIN.) =   5.32   Tc(MIN.) =   18.96
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.395
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                A       11.83      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   11.83      SUBAREA RUNOFF(CFS) =   24.46
 EFFECTIVE AREA(ACRES) =     15.58    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       15.6        PEAK FLOW RATE(CFS) =      32.22

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.68   HALFSTREET FLOOD WIDTH(FEET) =  18.54
 FLOW VELOCITY(FEET/SEC.) =  2.56   DEPTH*VELOCITY(FT*FT/SEC.) =   1.73
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5004.00 =    1600.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5004.00 TO NODE   5006.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  804.00  DOWNSTREAM ELEVATION(FEET) =  800.00
 STREET LENGTH(FEET) =   530.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      43.96
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.64
   HALFSTREET FLOOD WIDTH(FEET) =   18.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.88
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.49
 STREET FLOW TRAVEL TIME(MIN.) =   2.27   Tc(MIN.) =   21.24
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.238
 SUBAREA LOSS RATE DATA(AMC  II):
```



```
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                A       12.19      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   12.19      SUBAREA RUNOFF(CFS) =   23.48
 EFFECTIVE AREA(ACRES) =     27.77    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       27.8        PEAK FLOW RATE(CFS) =      53.49

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.68   HALFSTREET FLOOD WIDTH(FEET) =  18.73
 FLOW VELOCITY(FEET/SEC.) =  4.20   DEPTH*VELOCITY(FT*FT/SEC.) =   2.86
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5006.00 =    2130.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5006.00 TO NODE   5010.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   793.00  DOWNSTREAM(FEET) =   784.00
 FLOW LENGTH(FEET) =   670.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.11
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      53.49
 PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =   22.24
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5010.00 =    2800.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.24
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.177
 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        1.27      0.98     0.850    32
 COMMERCIAL                A       12.40      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.170
 SUBAREA AREA(ACRES) =   13.67      SUBAREA RUNOFF(CFS) =   24.74
 EFFECTIVE AREA(ACRES) =     41.44   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.12
 TOTAL AREA(ACRES) =       41.4        PEAK FLOW RATE(CFS) =      76.70

****************************************************************************
 FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.24
```

```
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.177
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.61      0.98     0.100    32
 PUBLIC PARK                A        0.16      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.256
 SUBAREA AREA(ACRES) =    0.77      SUBAREA RUNOFF(CFS) =    1.34
 EFFECTIVE AREA(ACRES) =     42.21   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.13
 TOTAL AREA(ACRES) =       42.2       PEAK FLOW RATE(CFS) =      78.04

****************************************************************************
 FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.24
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.177
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.61      0.98     0.100    32
 PUBLIC PARK                A        0.51      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.442
 SUBAREA AREA(ACRES) =    1.12      SUBAREA RUNOFF(CFS) =    1.76
 EFFECTIVE AREA(ACRES) =     43.33   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.13
 TOTAL AREA(ACRES) =       43.3       PEAK FLOW RATE(CFS) =      79.80

****************************************************************************
 FLOW PROCESS FROM NODE   5010.00 TO NODE   5011.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   784.00  DOWNSTREAM(FEET) =   782.48
 FLOW LENGTH(FEET) =   479.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.18
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      79.80
 PIPE TRAVEL TIME(MIN.) =   1.11    Tc(MIN.) =   23.35
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5011.00 =    3279.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5011.00 TO NODE   5011.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   23.35
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.114
 SUBAREA LOSS RATE DATA(AMC  II):
```



```
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.63      0.98     0.100    32
 PUBLIC PARK                A        0.52      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.439
 SUBAREA AREA(ACRES) =    1.15      SUBAREA RUNOFF(CFS) =    1.74
 EFFECTIVE AREA(ACRES) =     44.48   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.14
 TOTAL AREA(ACRES) =       44.5       PEAK FLOW RATE(CFS) =      79.80
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5011.00 TO NODE   5012.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   782.48  DOWNSTREAM(FEET) =   780.95
 FLOW LENGTH(FEET) =   482.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.18
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      79.80
 PIPE TRAVEL TIME(MIN.) =   1.12    Tc(MIN.) =   24.47
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5012.00 =    3761.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5012.00 TO NODE   5012.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   24.47
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.055
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.53      0.98     0.100    32
 PUBLIC PARK                A        0.36      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.403
 SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    1.33
 EFFECTIVE AREA(ACRES) =     45.37   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.15
 TOTAL AREA(ACRES) =       45.4       PEAK FLOW RATE(CFS) =      79.80
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5012.00 TO NODE   5015.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   780.95  DOWNSTREAM(FEET) =   779.48
 FLOW LENGTH(FEET) =   460.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.20
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      79.80
 PIPE TRAVEL TIME(MIN.) =   1.06    Tc(MIN.) =   25.54
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5015.00 =    4221.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5015.00 TO NODE   5015.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   25.54
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.003
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.46      0.98     0.100    32
 PUBLIC PARK                A        0.38      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.439
 SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    1.19
 EFFECTIVE AREA(ACRES) =     46.21   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.15
 TOTAL AREA(ACRES) =       46.2       PEAK FLOW RATE(CFS) =      79.80
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5015.00 TO NODE   5020.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   779.48  DOWNSTREAM(FEET) =   760.54
 FLOW LENGTH(FEET) =  1937.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.00
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      79.80
 PIPE TRAVEL TIME(MIN.) =   2.93    Tc(MIN.) =   28.47
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5020.00 =    6158.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   28.47
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.877
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        1.20      0.98     0.100    32
 PUBLIC PARK                A        1.11      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
```



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 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.460
 SUBAREA AREA(ACRES) =    2.31      SUBAREA RUNOFF(CFS) =    2.97
 EFFECTIVE AREA(ACRES) =     48.52   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.17
 TOTAL AREA(ACRES) =       48.5       PEAK FLOW RATE(CFS) =      79.80
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   28.47
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.877
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 SCHOOL                     A        4.59      0.98     0.600    32
 COMMERCIAL                 A        2.10      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.443
 SUBAREA AREA(ACRES) =    6.69      SUBAREA RUNOFF(CFS) =    8.70
 EFFECTIVE AREA(ACRES) =     55.21   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =       55.2       PEAK FLOW RATE(CFS) =      83.57

****************************************************************************
 FLOW PROCESS FROM NODE   5020.00 TO NODE   5114.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   760.54  DOWNSTREAM(FEET) =   748.44
 FLOW LENGTH(FEET) =  1019.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.73
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      83.57
 PIPE TRAVEL TIME(MIN.) =   1.45    Tc(MIN.) =   29.92
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5114.00 =    7177.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5114.00 TO NODE   5114.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   29.92
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.822
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.68      0.98     0.100    32
 PUBLIC PARK                A        0.64      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.464
```

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  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    1.63
  EFFECTIVE AREA(ACRES) =     56.53   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.21
  TOTAL AREA(ACRES) =       56.5       PEAK FLOW RATE(CFS) =      83.57
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5114.00 TO NODE   5114.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.822
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.75      0.98     0.100    32
  PUBLIC PARK                A        0.57      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.424
  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    1.67
  EFFECTIVE AREA(ACRES) =     57.85   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.21
  TOTAL AREA(ACRES) =       57.9       PEAK FLOW RATE(CFS) =      84.13

****************************************************************************
  FLOW PROCESS FROM NODE   5114.00 TO NODE   5114.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.822
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.83      0.98     0.100    32
  PUBLIC PARK                A        0.66      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.432
  SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    1.88
  EFFECTIVE AREA(ACRES) =     59.34   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.22
  TOTAL AREA(ACRES) =       59.3       PEAK FLOW RATE(CFS) =      86.01

****************************************************************************
  FLOW PROCESS FROM NODE   5114.00 TO NODE   5155.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   748.44  DOWNSTREAM(FEET) =   747.58
  FLOW LENGTH(FEET) =    47.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  26.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.23
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
```



```
  PIPE-FLOW(CFS) =      86.01
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   29.97
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5155.00 =    7224.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5115.00 TO NODE   5115.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5043.00 TO NODE   5044.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   410.00
  ELEVATION DATA: UPSTREAM(FEET) =    773.59  DOWNSTREAM(FEET) =    768.25

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.036
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.009
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.32      0.98     0.100    32    8.04
  PUBLIC PARK                A        0.30      0.98     0.850    32   12.77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.463
  SUBAREA RUNOFF(CFS) =      1.99
  TOTAL AREA(ACRES) =      0.62   PEAK FLOW RATE(CFS) =      1.99

****************************************************************************
  FLOW PROCESS FROM NODE   5044.00 TO NODE   5044.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.04
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.009
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.32      0.98     0.100    32
  PUBLIC PARK                A        0.30      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.463
  SUBAREA AREA(ACRES) =    0.62      SUBAREA RUNOFF(CFS) =    1.99
  EFFECTIVE AREA(ACRES) =      1.24   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        1.2       PEAK FLOW RATE(CFS) =       3.97

****************************************************************************
  FLOW PROCESS FROM NODE   5044.00 TO NODE   5045.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   757.77  DOWNSTREAM(FEET) =   753.86
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.28
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.97
  PIPE TRAVEL TIME(MIN.) =   1.26    Tc(MIN.) =    9.30
  LONGEST FLOWPATH FROM NODE   5043.00 TO NODE   5045.00 =     810.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5045.00 TO NODE   5045.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    9.30
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.673
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.29      0.98     0.100    32
  PUBLIC PARK                A        0.27      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.462
  SUBAREA AREA(ACRES) =    0.56      SUBAREA RUNOFF(CFS) =    1.62
  EFFECTIVE AREA(ACRES) =      1.80   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        1.8       PEAK FLOW RATE(CFS) =       5.22

****************************************************************************
  FLOW PROCESS FROM NODE   5045.00 TO NODE   5045.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    9.30
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.673
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.29      0.98     0.100    32
  PUBLIC PARK                A        0.27      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.462
  SUBAREA AREA(ACRES) =    0.56      SUBAREA RUNOFF(CFS) =    1.62
  EFFECTIVE AREA(ACRES) =      2.36   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       6.84

****************************************************************************
  FLOW PROCESS FROM NODE   5045.00 TO NODE   5045.00 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.) =    9.30
  RAINFALL INTENSITY(INCH/HR) =   3.67
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.46
  EFFECTIVE STREAM AREA(ACRES) =       2.36
  TOTAL STREAM AREA(ACRES) =       2.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.84

****************************************************************************
  FLOW PROCESS FROM NODE   5025.00 TO NODE   5030.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   720.00
  ELEVATION DATA: UPSTREAM(FEET) =    793.00  DOWNSTREAM(FEET) =    785.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.391
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.436
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        5.96      0.98     0.100    32   10.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     17.91
  TOTAL AREA(ACRES) =      5.96   PEAK FLOW RATE(CFS) =     17.91

****************************************************************************
  FLOW PROCESS FROM NODE   5030.00 TO NODE   5035.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    785.00  DOWNSTREAM(FEET) =    784.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE =  0.0021
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.941
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        8.48      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      28.78
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.84
  AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   3.08
  Tc(MIN.) =   13.47
  SUBAREA AREA(ACRES) =     8.48      SUBAREA RUNOFF(CFS) =   21.70
  EFFECTIVE AREA(ACRES) =     14.44     AREA-AVERAGED Fm(INCH/HR) =   0.10
```

```
 AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =       14.4         PEAK FLOW RATE(CFS) =      36.95

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =   1.96
 LONGEST FLOWPATH FROM NODE   5025.00 TO NODE   5035.00 =    1060.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5035.00 TO NODE   5040.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   774.30  DOWNSTREAM(FEET) =   770.10
 FLOW LENGTH(FEET) =   860.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      36.95
 PIPE TRAVEL TIME(MIN.) =   2.05    Tc(MIN.) =   15.52
 LONGEST FLOWPATH FROM NODE   5025.00 TO NODE   5040.00 =    1920.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5040.00 TO NODE   5040.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.52
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.701
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A       19.84      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   19.84      SUBAREA RUNOFF(CFS) =   46.50
 EFFECTIVE AREA(ACRES) =     34.28   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       34.3       PEAK FLOW RATE(CFS) =      80.34

****************************************************************************
 FLOW PROCESS FROM NODE   5040.00 TO NODE   5045.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   770.10  DOWNSTREAM(FEET) =   753.86
 FLOW LENGTH(FEET) =  1010.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  26.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.33
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      80.34
 PIPE TRAVEL TIME(MIN.) =   1.26    Tc(MIN.) =   16.78
 LONGEST FLOWPATH FROM NODE   5025.00 TO NODE   5045.00 =    2930.00 FEET.
```



```
****************************************************************************
 FLOW PROCESS FROM NODE   5045.00 TO NODE   5045.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.78
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.578
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A       23.34      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   23.34      SUBAREA RUNOFF(CFS) =   52.10
 EFFECTIVE AREA(ACRES) =     57.62   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       57.6       PEAK FLOW RATE(CFS) =     128.61

****************************************************************************
 FLOW PROCESS FROM NODE   5045.00 TO NODE   5045.00 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.) =   16.78
 RAINFALL INTENSITY(INCH/HR) =   2.58
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.97
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =      57.62
 TOTAL STREAM AREA(ACRES) =      57.62
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     128.61

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        6.84    9.30    3.673  0.98( 0.45) 0.46       2.4    5043.00
     2      128.61   16.78    2.578  0.97( 0.10) 0.10      57.6    5025.00

 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      109.60    9.30    3.673  0.97( 0.12) 0.12      34.3    5043.00
     2      133.13   16.78    2.578  0.97( 0.11) 0.11      60.0    5025.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     133.13    Tc(MIN.) =    16.78
 EFFECTIVE AREA(ACRES) =      59.98   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.11
 TOTAL AREA(ACRES) =       60.0
```

```
 LONGEST FLOWPATH FROM NODE   5025.00 TO NODE   5045.00 =    2930.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5045.00 TO NODE   5046.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   753.86  DOWNSTREAM(FEET) =   752.05
 FLOW LENGTH(FEET) =   461.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  46.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.69
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     133.13
 PIPE TRAVEL TIME(MIN.) =   0.88    Tc(MIN.) =   17.66
 LONGEST FLOWPATH FROM NODE   5025.00 TO NODE   5046.00 =    3391.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5046.00 TO NODE   5046.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.66
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.499
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.49      0.98     0.100    32
 PUBLIC PARK                A        0.46      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.463
 SUBAREA AREA(ACRES) =    0.95      SUBAREA RUNOFF(CFS) =    1.75
 EFFECTIVE AREA(ACRES) =     60.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.12
 TOTAL AREA(ACRES) =       60.9       PEAK FLOW RATE(CFS) =     133.13
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5046.00 TO NODE   5046.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.66
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.499
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.49      0.98     0.100    32
 PUBLIC PARK                A        0.46      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.463
 SUBAREA AREA(ACRES) =    0.95      SUBAREA RUNOFF(CFS) =    1.75
 EFFECTIVE AREA(ACRES) =     61.88   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.12
 TOTAL AREA(ACRES) =       61.9       PEAK FLOW RATE(CFS) =     133.13
```



```
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5046.00 TO NODE   5046.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.66
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.499
 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       13.50      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =   13.50      SUBAREA RUNOFF(CFS) =   20.30
 EFFECTIVE AREA(ACRES) =     75.38   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.25
 TOTAL AREA(ACRES) =       75.4       PEAK FLOW RATE(CFS) =     152.70

****************************************************************************
 FLOW PROCESS FROM NODE   5046.00 TO NODE   5110.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   752.05  DOWNSTREAM(FEET) =   749.99
 FLOW LENGTH(FEET) =   590.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  47.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.71
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     152.70
 PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =   18.79
 LONGEST FLOWPATH FROM NODE   5025.00 TO NODE   5110.00 =    3981.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5110.00 TO NODE   5110.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.79
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.408
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.26      0.98     0.100    32
 PUBLIC PARK                A        0.23      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.452
 SUBAREA AREA(ACRES) =    0.49      SUBAREA RUNOFF(CFS) =    0.87
 EFFECTIVE AREA(ACRES) =     75.87   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.26
 TOTAL AREA(ACRES) =       75.9       PEAK FLOW RATE(CFS) =     152.70
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5110.00 TO NODE   5110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.408
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.25      0.98     0.100    32
  PUBLIC PARK                A        0.24      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.467
  SUBAREA AREA(ACRES) =    0.49      SUBAREA RUNOFF(CFS) =    0.86
  EFFECTIVE AREA(ACRES) =     76.36   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =       76.4       PEAK FLOW RATE(CFS) =     152.70
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5110.00 TO NODE   5110.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5050.00 TO NODE   5055.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   520.00
  ELEVATION DATA: UPSTREAM(FEET) =    797.72  DOWNSTREAM(FEET) =    783.05

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.689
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.584
  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.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        6.57      0.98     0.500    32    9.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     18.31
  TOTAL AREA(ACRES) =      6.57   PEAK FLOW RATE(CFS) =     18.31

****************************************************************************
  FLOW PROCESS FROM NODE   5055.00 TO NODE   5060.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   773.05  DOWNSTREAM(FEET) =   764.33
```



```
  FLOW LENGTH(FEET) =   740.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.21
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.31
  PIPE TRAVEL TIME(MIN.) =   1.50    Tc(MIN.) =   11.19
  LONGEST FLOWPATH FROM NODE   5050.00 TO NODE   5060.00 =    1260.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5060.00 TO NODE   5060.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.287
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        9.33      0.98     0.500    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    9.33      SUBAREA RUNOFF(CFS) =   23.50
  EFFECTIVE AREA(ACRES) =     15.90   AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       15.9       PEAK FLOW RATE(CFS) =      40.06

****************************************************************************
  FLOW PROCESS FROM NODE   5060.00 TO NODE   5065.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   764.33  DOWNSTREAM(FEET) =   761.54
  FLOW LENGTH(FEET) =   525.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.35
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.06
  PIPE TRAVEL TIME(MIN.) =   1.19    Tc(MIN.) =   12.38
  LONGEST FLOWPATH FROM NODE   5050.00 TO NODE   5065.00 =    1785.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5065.00 TO NODE   5065.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.093
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        5.49      0.98     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    5.49      SUBAREA RUNOFF(CFS) =   14.32
 EFFECTIVE AREA(ACRES) =     21.39   AREA-AVERAGED Fm(INCH/HR) =  0.41
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.42
 TOTAL AREA(ACRES) =       21.4       PEAK FLOW RATE(CFS) =      51.61

****************************************************************************
 FLOW PROCESS FROM NODE   5065.00 TO NODE   5100.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   761.54  DOWNSTREAM(FEET) =   759.53
 FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.59
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      51.61
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   12.64
 LONGEST FLOWPATH FROM NODE   5050.00 TO NODE   5100.00 =    1950.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5100.00 TO NODE   5100.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.64
 RAINFALL INTENSITY(INCH/HR) =   3.05
 AREA-AVERAGED Fm(INCH/HR) =  0.41
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.42
 EFFECTIVE STREAM AREA(ACRES) =      21.39
 TOTAL STREAM AREA(ACRES) =      21.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      51.61

****************************************************************************
 FLOW PROCESS FROM NODE   5070.00 TO NODE   5075.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   730.00
 ELEVATION DATA: UPSTREAM(FEET) =    797.68  DOWNSTREAM(FEET) =    779.53

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.381
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.254
 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.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        1.43      0.98     0.500    32   11.38
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
```



```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =      3.56
 TOTAL AREA(ACRES) =      1.43   PEAK FLOW RATE(CFS) =      3.56

****************************************************************************
 FLOW PROCESS FROM NODE   5075.00 TO NODE   5100.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  779.53  DOWNSTREAM ELEVATION(FEET) =  769.53
 STREET LENGTH(FEET) =  1040.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.97
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.37
   HALFSTREET FLOOD WIDTH(FEET) =   10.45
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.33
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
 STREET FLOW TRAVEL TIME(MIN.) =   7.44   Tc(MIN.) =   18.82
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.406
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        1.00      0.98     0.500    32
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       A        1.54      0.98     0.200    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.318
 SUBAREA AREA(ACRES) =    2.54      SUBAREA RUNOFF(CFS) =    4.79
 EFFECTIVE AREA(ACRES) =      3.97    AREA-AVERAGED Fm(INCH/HR) =  0.37
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.38
 TOTAL AREA(ACRES) =        4.0        PEAK FLOW RATE(CFS) =       7.26

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  11.39
 FLOW VELOCITY(FEET/SEC.) =  2.44   DEPTH*VELOCITY(FT*FT/SEC.) =   0.94
 LONGEST FLOWPATH FROM NODE   5070.00 TO NODE   5100.00 =    1770.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5100.00 TO NODE   5100.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.82
 RAINFALL INTENSITY(INCH/HR) =   2.41
 AREA-AVERAGED Fm(INCH/HR) =  0.37
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.38
 EFFECTIVE STREAM AREA(ACRES) =       3.97
 TOTAL STREAM AREA(ACRES) =       3.97
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.26

****************************************************************************
 FLOW PROCESS FROM NODE   5080.00 TO NODE   5085.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   520.00
 ELEVATION DATA: UPSTREAM(FEET) =    797.72  DOWNSTREAM(FEET) =    783.05

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.689
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.584
 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.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        6.58      0.98     0.500    32    9.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA RUNOFF(CFS) =     18.33
 TOTAL AREA(ACRES) =      6.58   PEAK FLOW RATE(CFS) =     18.33

****************************************************************************
 FLOW PROCESS FROM NODE   5085.00 TO NODE   5090.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   773.05  DOWNSTREAM(FEET) =   767.13
 FLOW LENGTH(FEET) =   410.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.91
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      18.33
 PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   10.46
 LONGEST FLOWPATH FROM NODE   5080.00 TO NODE   5090.00 =     930.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5090.00 TO NODE   5090.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.46
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.423
```



```
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        6.91      0.98     0.500    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     6.91      SUBAREA RUNOFF(CFS) =   18.26
 EFFECTIVE AREA(ACRES) =     13.49   AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =       13.5       PEAK FLOW RATE(CFS) =      35.65

****************************************************************************
 FLOW PROCESS FROM NODE   5090.00 TO NODE   5095.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   767.13  DOWNSTREAM(FEET) =   763.05
 FLOW LENGTH(FEET) =   355.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.55
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      35.65
 PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   11.08
 LONGEST FLOWPATH FROM NODE   5080.00 TO NODE   5095.00 =    1285.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5095.00 TO NODE   5095.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.08
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.307
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       A        3.86      0.98     0.200    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     3.86      SUBAREA RUNOFF(CFS) =   10.81
 EFFECTIVE AREA(ACRES) =     17.35   AREA-AVERAGED Fm(INCH/HR) =  0.42
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.43
 TOTAL AREA(ACRES) =       17.4       PEAK FLOW RATE(CFS) =      45.05

****************************************************************************
 FLOW PROCESS FROM NODE   5095.00 TO NODE   5100.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   763.05  DOWNSTREAM(FEET) =   759.53
 FLOW LENGTH(FEET) =   686.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  29.3 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.31
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      45.05
 PIPE TRAVEL TIME(MIN.) =   1.56    Tc(MIN.) =   12.64
 LONGEST FLOWPATH FROM NODE   5080.00 TO NODE   5100.00 =    1971.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5100.00 TO NODE   5100.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.64
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.055
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       A        6.90      0.98     0.200    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    6.90      SUBAREA RUNOFF(CFS) =   17.76
 EFFECTIVE AREA(ACRES) =     24.25   AREA-AVERAGED Fm(INCH/HR) =  0.36
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.37
 TOTAL AREA(ACRES) =       24.2       PEAK FLOW RATE(CFS) =      58.87

****************************************************************************
 FLOW PROCESS FROM NODE   5100.00 TO NODE   5100.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.64
 RAINFALL INTENSITY(INCH/HR) =   3.06
 AREA-AVERAGED Fm(INCH/HR) =  0.36
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.37
 EFFECTIVE STREAM AREA(ACRES) =      24.25
 TOTAL STREAM AREA(ACRES) =      24.25
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      58.87

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       51.61   12.64    3.055  0.98( 0.41) 0.42      21.4    5050.00
     2        7.26   18.82    2.406  0.98( 0.37) 0.38       4.0    5070.00
     3       58.87   12.64    3.055  0.98( 0.36) 0.37      24.2    5080.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```



```
     1      116.91   12.64    3.055  0.98( 0.38) 0.39      48.3    5080.00
     2      116.91   12.64    3.055  0.97( 0.38) 0.39      48.3    5050.00
     3       90.89   18.82    2.406  0.98( 0.38) 0.39      49.6    5070.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     116.91    Tc(MIN.) =    12.64
 EFFECTIVE AREA(ACRES) =      48.30   AREA-AVERAGED Fm(INCH/HR) =  0.38
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       49.6
 LONGEST FLOWPATH FROM NODE   5080.00 TO NODE   5100.00 =    1971.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5100.00 TO NODE   5105.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   759.53  DOWNSTREAM(FEET) =   757.79
 FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.62
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     116.91
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   13.03
 LONGEST FLOWPATH FROM NODE   5080.00 TO NODE   5105.00 =    2221.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5105.00 TO NODE   5105.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.03
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.000
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       A        7.08      0.98     0.200    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    7.08      SUBAREA RUNOFF(CFS) =   17.87
 EFFECTIVE AREA(ACRES) =     55.38   AREA-AVERAGED Fm(INCH/HR) =  0.36
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.37
 TOTAL AREA(ACRES) =       56.7       PEAK FLOW RATE(CFS) =     131.63

****************************************************************************
 FLOW PROCESS FROM NODE   5105.00 TO NODE   5110.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   757.79  DOWNSTREAM(FEET) =   754.21
 FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  41.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.68
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     131.63
 PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =   13.84
 LONGEST FLOWPATH FROM NODE   5080.00 TO NODE   5110.00 =    2741.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5110.00 TO NODE   5110.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.84
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.893
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       A       14.26      0.98     0.200    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =   14.26      SUBAREA RUNOFF(CFS) =   34.62
 EFFECTIVE AREA(ACRES) =     69.64   AREA-AVERAGED Fm(INCH/HR) =  0.33
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.33
 TOTAL AREA(ACRES) =       71.0       PEAK FLOW RATE(CFS) =     160.93

****************************************************************************
 FLOW PROCESS FROM NODE   5100.00 TO NODE   5100.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      160.93   13.84    2.893  0.98( 0.33) 0.33      69.6    5080.00
     2      160.93   13.84    2.893  0.98( 0.33) 0.33      69.6    5050.00
     3      126.89   20.09    2.313  0.98( 0.33) 0.33      71.0    5070.00
 LONGEST FLOWPATH FROM NODE   5080.00 TO NODE   5100.00 =    2741.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      140.63   11.38    3.254  0.97( 0.33) 0.34      50.7    5043.00
     2      152.70   18.79    2.408  0.97( 0.25) 0.26      76.4    5025.00
 LONGEST FLOWPATH FROM NODE   5025.00 TO NODE   5100.00 =    3981.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      291.52   11.38    3.254  0.98( 0.33) 0.34     107.9    5043.00
     2      305.58   13.84    2.893  0.98( 0.32) 0.32     128.9    5080.00
     3      305.57   13.84    2.893  0.97( 0.32) 0.32     128.9    5050.00
     4      286.68   18.79    2.408  0.98( 0.29) 0.29     147.0    5025.00
     5      272.88   20.09    2.313  0.98( 0.29) 0.29     147.3    5070.00
   TOTAL AREA(ACRES) =       147.3
```



```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      305.58  Tc(MIN.) =   13.843
 EFFECTIVE AREA(ACRES) =    128.85  AREA-AVERAGED Fm(INCH/HR) =  0.32
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =      147.3
 LONGEST FLOWPATH FROM NODE   5025.00 TO NODE   5100.00 =    3981.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5110.00 TO NODE   5111.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   5110.00 TO NODE   5111.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   749.99  DOWNSTREAM(FEET) =   749.73
 FLOW LENGTH(FEET) =    86.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  84.0 INCH PIPE IS  63.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.82
 ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     305.58
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.99
 LONGEST FLOWPATH FROM NODE   5025.00 TO NODE   5111.00 =    4067.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5111.00 TO NODE   5111.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.99
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.875
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.29      0.98     0.100    32
 PUBLIC PARK                A        0.21      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.415
 SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.11
 EFFECTIVE AREA(ACRES) =    129.35   AREA-AVERAGED Fm(INCH/HR) =  0.32
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.32
 TOTAL AREA(ACRES) =      147.8       PEAK FLOW RATE(CFS) =     305.58
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5111.00 TO NODE   5111.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.99
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.875
```

```
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.25      0.98     0.100    32
 PUBLIC PARK                A        0.24      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.467
 SUBAREA AREA(ACRES) =     0.49      SUBAREA RUNOFF(CFS) =     1.07
 EFFECTIVE AREA(ACRES) =    129.84   AREA-AVERAGED Fm(INCH/HR) =  0.32
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.32
 TOTAL AREA(ACRES) =      148.3       PEAK FLOW RATE(CFS) =     305.58
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5111.00 TO NODE   5115.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   749.73  DOWNSTREAM(FEET) =   747.73
 FLOW LENGTH(FEET) =   581.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  81.0 INCH PIPE IS  62.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.26
 ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     305.58
 PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =   14.93
 LONGEST FLOWPATH FROM NODE   5025.00 TO NODE   5115.00 =    4648.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5115.00 TO NODE   5115.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.93
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.764
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.29      0.98     0.100    32
 COMMERCIAL                 A        0.22      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.51      SUBAREA RUNOFF(CFS) =     1.22
 EFFECTIVE AREA(ACRES) =    130.35   AREA-AVERAGED Fm(INCH/HR) =  0.32
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.32
 TOTAL AREA(ACRES) =      148.8       PEAK FLOW RATE(CFS) =     305.58
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5115.00 TO NODE   5115.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.93
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.764
```



```
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.28      0.98     0.100    32
 PUBLIC PARK                A        0.21      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.421
 SUBAREA AREA(ACRES) =     0.49      SUBAREA RUNOFF(CFS) =     1.04
 EFFECTIVE AREA(ACRES) =    130.84   AREA-AVERAGED Fm(INCH/HR) =  0.32
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.32
 TOTAL AREA(ACRES) =      149.3       PEAK FLOW RATE(CFS) =     305.58
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5115.00 TO NODE   5115.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      291.52   12.50    3.076  0.97( 0.33) 0.34     109.9    5043.00
     2      305.58   14.93    2.764  0.97( 0.32) 0.32     130.8    5080.00
     3      305.57   14.93    2.764  0.97( 0.32) 0.32     130.9    5050.00
     4      286.68   19.91    2.326  0.98( 0.29) 0.30     149.0    5025.00
     5      272.88   21.22    2.239  0.98( 0.29) 0.30     149.3    5070.00
 LONGEST FLOWPATH FROM NODE   5025.00 TO NODE   5115.00 =    4648.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       86.01   29.97    1.820  0.98( 0.21) 0.22      59.3    5000.00
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5115.00 =    7224.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      355.39   12.50    3.076  0.97( 0.31) 0.31     134.7    5043.00
     2      373.59   14.93    2.764  0.98( 0.30) 0.30     160.4    5080.00
     3      373.59   14.93    2.764  0.97( 0.30) 0.30     160.4    5050.00
     4      361.79   19.91    2.326  0.98( 0.27) 0.28     188.4    5025.00
     5      349.62   21.22    2.239  0.98( 0.27) 0.28     191.3    5070.00
     6      300.24   29.97    1.820  0.98( 0.27) 0.27     208.6    5000.00
   TOTAL AREA(ACRES) =       208.6

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      373.59  Tc(MIN.) =   14.933
 EFFECTIVE AREA(ACRES) =    160.41  AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.30
 TOTAL AREA(ACRES) =      208.6
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5115.00 =    7224.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5115.00 TO NODE   5115.00 IS CODE =  12
```

```
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5115.00 TO NODE   5116.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   747.58  DOWNSTREAM(FEET) =   746.68
  FLOW LENGTH(FEET) =   301.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  90.0 INCH PIPE IS  69.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.25
  ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     373.59
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   15.42
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5116.00 =    7525.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5116.00 TO NODE   5116.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.42
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.711
  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        7.72      0.98     0.850    32
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        1.94      0.98     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.719
  SUBAREA AREA(ACRES) =    9.66      SUBAREA RUNOFF(CFS) =   17.47
  EFFECTIVE AREA(ACRES) =    170.07   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.33
  TOTAL AREA(ACRES) =      218.3       PEAK FLOW RATE(CFS) =     373.59
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5116.00 TO NODE   5117.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   746.68  DOWNSTREAM(FEET) =   744.57
  FLOW LENGTH(FEET) =   389.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  61.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.85
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     373.59
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   15.93
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5117.00 =    7914.00 FEET.
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   5117.00 TO NODE   5117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.93
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.659
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.51      0.98     0.100    32
  PUBLIC PARK                A        0.48      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.464
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    1.97
  EFFECTIVE AREA(ACRES) =    171.06   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.33
  TOTAL AREA(ACRES) =      219.3       PEAK FLOW RATE(CFS) =     373.59
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5117.00 TO NODE   5141.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   744.57  DOWNSTREAM(FEET) =   734.24
  FLOW LENGTH(FEET) =  1156.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  58.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.31
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     373.59
  PIPE TRAVEL TIME(MIN.) =   1.26    Tc(MIN.) =   17.19
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5141.00 =    9070.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5141.00 TO NODE   5141.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.85      0.98     0.100    32
  PUBLIC PARK                A        0.79      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.461
  SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    3.09
  EFFECTIVE AREA(ACRES) =    172.70   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.33
  TOTAL AREA(ACRES) =      220.9       PEAK FLOW RATE(CFS) =     373.59
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5141.00 TO NODE   5141.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.65      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.65      SUBAREA RUNOFF(CFS) =    3.63
  EFFECTIVE AREA(ACRES) =    174.35   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.33
  TOTAL AREA(ACRES) =      222.6       PEAK FLOW RATE(CFS) =     373.59
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5141.00 TO NODE   5141.00 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.) =   17.19
  RAINFALL INTENSITY(INCH/HR) =   2.54
  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.33
  EFFECTIVE STREAM AREA(ACRES) =     174.35
  TOTAL STREAM AREA(ACRES) =     222.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     373.59

****************************************************************************
  FLOW PROCESS FROM NODE   5142.00 TO NODE   5143.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   800.00
  ELEVATION DATA: UPSTREAM(FEET) =    762.00  DOWNSTREAM(FEET) =    753.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.739
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.194
  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.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        5.30      0.98     0.200    32   11.74
  PUBLIC PARK                A        0.84      0.98     0.850    32   17.50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.289
```



```
  SUBAREA RUNOFF(CFS) =     16.09
  TOTAL AREA(ACRES) =      6.14   PEAK FLOW RATE(CFS) =     16.09

****************************************************************************
  FLOW PROCESS FROM NODE   5143.00 TO NODE   5144.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  753.80  DOWNSTREAM ELEVATION(FEET) =  741.50
  STREET LENGTH(FEET) =  1190.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      43.90
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.61
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.26
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.62
  STREET FLOW TRAVEL TIME(MIN.) =   4.66   Tc(MIN.) =   16.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.614
  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        1.00      0.98     0.850    32
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       24.59      0.98     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.225
  SUBAREA AREA(ACRES) =   25.59      SUBAREA RUNOFF(CFS) =   55.13
  EFFECTIVE AREA(ACRES) =     31.73    AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =       31.7        PEAK FLOW RATE(CFS) =      68.02

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.70   HALFSTREET FLOOD WIDTH(FEET) =  19.64
  FLOW VELOCITY(FEET/SEC.) =  5.06   DEPTH*VELOCITY(FT*FT/SEC.) =   3.54
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1190.0 FT WITH ELEVATION-DROP =  12.3 FT, IS   61.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   5144.00
  LONGEST FLOWPATH FROM NODE   5142.00 TO NODE   5144.00 =    1990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5144.00 TO NODE   5141.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   741.50  DOWNSTREAM(FEET) =   735.66
  FLOW LENGTH(FEET) =   776.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.61
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      68.02
  PIPE TRAVEL TIME(MIN.) =   1.35    Tc(MIN.) =   17.74
  LONGEST FLOWPATH FROM NODE   5142.00 TO NODE   5141.00 =    2766.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5141.00 TO NODE   5141.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.493
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       17.41      0.98     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   17.41      SUBAREA RUNOFF(CFS) =   36.00
  EFFECTIVE AREA(ACRES) =     49.14   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.22
  TOTAL AREA(ACRES) =       49.1       PEAK FLOW RATE(CFS) =     100.57

****************************************************************************
  FLOW PROCESS FROM NODE   5141.00 TO NODE   5141.00 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.) =   17.74
  RAINFALL INTENSITY(INCH/HR) =   2.49
  AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.22
  EFFECTIVE STREAM AREA(ACRES) =      49.14
  TOTAL STREAM AREA(ACRES) =      49.14
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     100.57

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      355.39   14.77    2.782  0.97( 0.33) 0.34     148.6    5043.00
      1      373.59   17.19    2.541  0.98( 0.32) 0.33     174.3    5080.00
      1      373.59   17.19    2.541  0.97( 0.32) 0.33     174.4    5050.00
      1      361.79   22.18    2.180  0.97( 0.29) 0.30     202.4    5025.00
```



```
      1      349.62   23.50    2.106  0.98( 0.29) 0.30     205.2    5070.00
      1      300.24   32.36    1.738  0.98( 0.29) 0.29     222.6    5000.00
      2      100.57   17.74    2.493  0.98( 0.22) 0.22      49.1    5142.00

  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      449.78   14.77    2.782  0.97( 0.31) 0.32     189.5    5043.00
      2      473.06   17.19    2.541  0.98( 0.30) 0.31     221.9    5080.00
      3      473.06   17.19    2.541  0.97( 0.30) 0.31     222.0    5050.00
      4      472.84   17.74    2.493  0.97( 0.30) 0.30     226.6    5142.00
      5      448.54   22.18    2.180  0.97( 0.28) 0.29     251.5    5025.00
      6      433.09   23.50    2.106  0.98( 0.28) 0.29     254.4    5070.00
      7      367.43   32.36    1.738  0.98( 0.27) 0.28     271.7    5000.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     473.06    Tc(MIN.) =    17.19
  EFFECTIVE AREA(ACRES) =     221.96   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      271.7
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5141.00 =    9070.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5141.00 TO NODE   5215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   734.24  DOWNSTREAM(FEET) =   720.42
  FLOW LENGTH(FEET) =   900.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  56.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.04
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     473.06
  PIPE TRAVEL TIME(MIN.) =   0.75    Tc(MIN.) =   17.94
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5215.00 =    9970.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5215.00 TO NODE   5215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.94
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.477
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.66      0.98     0.100    32
  PUBLIC PARK                A        0.63      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.466
  SUBAREA AREA(ACRES) =    1.29      SUBAREA RUNOFF(CFS) =    2.35
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  EFFECTIVE AREA(ACRES) =    223.25   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      273.0       PEAK FLOW RATE(CFS) =     473.06
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5215.00 TO NODE   5215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.94
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.477
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.80      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    1.71
  EFFECTIVE AREA(ACRES) =    224.05   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =      273.8       PEAK FLOW RATE(CFS) =     473.06
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5215.00 TO NODE   5215.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5120.00 TO NODE   5125.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   563.00
  ELEVATION DATA: UPSTREAM(FEET) =    768.00  DOWNSTREAM(FEET) =    766.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.530
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.071
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        4.78      0.98     0.100    32   12.53
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     12.79
  TOTAL AREA(ACRES) =      4.78   PEAK FLOW RATE(CFS) =     12.79

****************************************************************************
  FLOW PROCESS FROM NODE   5125.00 TO NODE   5130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```



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  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    766.50  DOWNSTREAM(FEET) =    763.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   819.00   CHANNEL SLOPE =  0.0037
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.379
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        7.05      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.06
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   6.64
  Tc(MIN.) =   19.17
  SUBAREA AREA(ACRES) =     7.05       SUBAREA RUNOFF(CFS) =   14.48
  EFFECTIVE AREA(ACRES) =     11.83     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =       11.8         PEAK FLOW RATE(CFS) =      24.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.32   FLOW VELOCITY(FEET/SEC.) =   2.15
  LONGEST FLOWPATH FROM NODE   5120.00 TO NODE   5130.00 =    1382.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5130.00 TO NODE   5135.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    763.50  DOWNSTREAM(FEET) =    759.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   481.00   CHANNEL SLOPE =  0.0094
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.221
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       14.16      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      37.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.44
  AVERAGE FLOW DEPTH(FEET) =   0.31   TRAVEL TIME(MIN.) =   2.33
  Tc(MIN.) =   21.50
  SUBAREA AREA(ACRES) =    14.16       SUBAREA RUNOFF(CFS) =   27.06
  EFFECTIVE AREA(ACRES) =     25.99     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =       26.0         PEAK FLOW RATE(CFS) =      49.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   3.72
  LONGEST FLOWPATH FROM NODE   5120.00 TO NODE   5135.00 =    1863.00 FEET.
```

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****************************************************************************
  FLOW PROCESS FROM NODE   5135.00 TO NODE   5136.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    759.00  DOWNSTREAM(FEET) =    755.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   387.00   CHANNEL SLOPE =  0.0090
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.124
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       11.50      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      60.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.88
  AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   1.66
  Tc(MIN.) =   23.17
  SUBAREA AREA(ACRES) =    11.50       SUBAREA RUNOFF(CFS) =   20.97
  EFFECTIVE AREA(ACRES) =     37.49     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =       37.5         PEAK FLOW RATE(CFS) =      68.37

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   4.02
  LONGEST FLOWPATH FROM NODE   5120.00 TO NODE   5136.00 =    2250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5136.00 TO NODE   5155.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    755.50  DOWNSTREAM(FEET) =    751.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   438.00   CHANNEL SLOPE =  0.0103
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.037
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       12.89      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      79.62
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.34
  AVERAGE FLOW DEPTH(FEET) =   0.44   TRAVEL TIME(MIN.) =   1.68
  Tc(MIN.) =   24.85
  SUBAREA AREA(ACRES) =    12.89       SUBAREA RUNOFF(CFS) =   22.49
  EFFECTIVE AREA(ACRES) =     50.38     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
```



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  TOTAL AREA(ACRES) =       50.4         PEAK FLOW RATE(CFS) =      87.92

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =   4.52
  LONGEST FLOWPATH FROM NODE   5120.00 TO NODE   5155.00 =    2688.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5155.00 TO NODE   5160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    751.00  DOWNSTREAM(FEET) =    747.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.0096
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.965
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       12.97      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      98.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.52
  AVERAGE FLOW DEPTH(FEET) =   0.49   TRAVEL TIME(MIN.) =   1.53
  Tc(MIN.) =   26.38
  SUBAREA AREA(ACRES) =    12.97       SUBAREA RUNOFF(CFS) =   21.80
  EFFECTIVE AREA(ACRES) =     63.35     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =       63.3         PEAK FLOW RATE(CFS) =     106.46

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   4.61
  LONGEST FLOWPATH FROM NODE   5120.00 TO NODE   5160.00 =    3103.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5160.00 TO NODE   5210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    747.00  DOWNSTREAM(FEET) =    738.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   503.00   CHANNEL SLOPE =  0.0173
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.904
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       16.23      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     119.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.89
```

```
 AVERAGE FLOW DEPTH(FEET) =   0.47   TRAVEL TIME(MIN.) =   1.42
 Tc(MIN.) =   27.81
 SUBAREA AREA(ACRES) =    16.23       SUBAREA RUNOFF(CFS) =   26.38
 EFFECTIVE AREA(ACRES) =     79.58     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =       79.6         PEAK FLOW RATE(CFS) =     129.36

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.49   FLOW VELOCITY(FEET/SEC.) =   6.02
 LONGEST FLOWPATH FROM NODE   5120.00 TO NODE   5210.00 =    3606.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5210.00 TO NODE   5210.00 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.) =   27.81
 RAINFALL INTENSITY(INCH/HR) =   1.90
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =      79.58
 TOTAL STREAM AREA(ACRES) =      79.58
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     129.36

****************************************************************************
 FLOW PROCESS FROM NODE   5170.00 TO NODE   5175.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   524.00
 ELEVATION DATA: UPSTREAM(FEET) =    771.10  DOWNSTREAM(FEET) =    766.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.396
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.650
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 A        4.16      0.98     0.100    32    9.40
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =     13.30
 TOTAL AREA(ACRES) =      4.16   PEAK FLOW RATE(CFS) =     13.30

****************************************************************************
 FLOW PROCESS FROM NODE   5175.00 TO NODE   5180.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    766.00  DOWNSTREAM(FEET) =    764.00
```



```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   917.00   CHANNEL SLOPE =  0.0022
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.451
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        7.07      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.87
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.73
 AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   8.86
 Tc(MIN.) =   18.25
 SUBAREA AREA(ACRES) =     7.07       SUBAREA RUNOFF(CFS) =   14.97
 EFFECTIVE AREA(ACRES) =     11.23     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =       11.2         PEAK FLOW RATE(CFS) =      23.78

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   1.78
 LONGEST FLOWPATH FROM NODE   5170.00 TO NODE   5180.00 =    1441.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5180.00 TO NODE   5185.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    764.00  DOWNSTREAM(FEET) =    758.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   477.00   CHANNEL SLOPE =  0.0115
 CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.290
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A       13.46      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      37.08
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.66
 AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   2.17
 Tc(MIN.) =   20.43
 SUBAREA AREA(ACRES) =    13.46       SUBAREA RUNOFF(CFS) =   26.57
 EFFECTIVE AREA(ACRES) =     24.69     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =       24.7         PEAK FLOW RATE(CFS) =      48.73

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   4.00
 LONGEST FLOWPATH FROM NODE   5170.00 TO NODE   5185.00 =    1918.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5185.00 TO NODE   5190.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    758.50  DOWNSTREAM(FEET) =    755.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   394.00   CHANNEL SLOPE =  0.0076
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.176
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       11.16      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      59.17
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.60
  AVERAGE FLOW DEPTH(FEET) =   0.41   TRAVEL TIME(MIN.) =   1.82
  Tc(MIN.) =   22.25
  SUBAREA AREA(ACRES) =    11.16       SUBAREA RUNOFF(CFS) =   20.88
  EFFECTIVE AREA(ACRES) =     35.85     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =       35.8         PEAK FLOW RATE(CFS) =      67.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   3.73
  LONGEST FLOWPATH FROM NODE   5170.00 TO NODE   5190.00 =    2312.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5190.00 TO NODE   5195.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    755.50  DOWNSTREAM(FEET) =    751.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   430.00   CHANNEL SLOPE =  0.0105
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.085
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       12.16      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      77.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.37
  AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   1.64
  Tc(MIN.) =   23.89
  SUBAREA AREA(ACRES) =    12.16       SUBAREA RUNOFF(CFS) =   21.75
  EFFECTIVE AREA(ACRES) =     48.01     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =       48.0         PEAK FLOW RATE(CFS) =      85.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```



```
  DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =   4.44
  LONGEST FLOWPATH FROM NODE   5170.00 TO NODE   5195.00 =    2742.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5195.00 TO NODE   5200.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    751.00  DOWNSTREAM(FEET) =    747.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   420.00   CHANNEL SLOPE =  0.0095
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.007
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       11.98      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      96.17
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.48
  AVERAGE FLOW DEPTH(FEET) =   0.49   TRAVEL TIME(MIN.) =   1.56
  Tc(MIN.) =   25.46
  SUBAREA AREA(ACRES) =    11.98       SUBAREA RUNOFF(CFS) =   20.59
  EFFECTIVE AREA(ACRES) =     59.99     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =       60.0         PEAK FLOW RATE(CFS) =     103.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   4.57
  LONGEST FLOWPATH FROM NODE   5170.00 TO NODE   5200.00 =    3162.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5200.00 TO NODE   5205.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    747.00  DOWNSTREAM(FEET) =    744.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   583.00   CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.892
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       14.13      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     114.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.69
  AVERAGE FLOW DEPTH(FEET) =   0.61   TRAVEL TIME(MIN.) =   2.64
  Tc(MIN.) =   28.09
  SUBAREA AREA(ACRES) =    14.13       SUBAREA RUNOFF(CFS) =   22.82
```

```
 EFFECTIVE AREA(ACRES) =     74.12     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =       74.1         PEAK FLOW RATE(CFS) =     119.70

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.63   FLOW VELOCITY(FEET/SEC.) =   3.70
 LONGEST FLOWPATH FROM NODE   5170.00 TO NODE   5205.00 =    3745.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5205.00 TO NODE   5210.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   734.60  DOWNSTREAM(FEET) =   728.80
 FLOW LENGTH(FEET) =  1150.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.43
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     119.70
 PIPE TRAVEL TIME(MIN.) =   2.03    Tc(MIN.) =   30.13
 LONGEST FLOWPATH FROM NODE   5170.00 TO NODE   5210.00 =    4895.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5210.00 TO NODE   5210.00 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.) =   30.13
 RAINFALL INTENSITY(INCH/HR) =   1.81
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =      74.12
 TOTAL STREAM AREA(ACRES) =      74.12
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     119.70

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      129.36   27.81    1.904  0.98( 0.10) 0.10      79.6    5120.00
     2      119.70   30.13    1.814  0.98( 0.10) 0.10      74.1    5170.00

 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      245.60   27.81    1.904  0.98( 0.10) 0.10     148.0    5120.00
     2      242.66   30.13    1.814  0.98( 0.10) 0.10     153.7    5170.00
```



```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     245.60    Tc(MIN.) =    27.81
 EFFECTIVE AREA(ACRES) =     147.99   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =      153.7
 LONGEST FLOWPATH FROM NODE   5170.00 TO NODE   5210.00 =    4895.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5210.00 TO NODE   5215.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   728.80  DOWNSTREAM(FEET) =   721.08
 FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.12
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     245.60
 PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   28.19
 LONGEST FLOWPATH FROM NODE   5170.00 TO NODE   5215.00 =    5315.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5215.00 TO NODE   5215.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      245.60   28.19    1.888  0.98( 0.10) 0.10     148.0    5120.00
     2      242.66   30.51    1.800  0.98( 0.10) 0.10     153.7    5170.00
 LONGEST FLOWPATH FROM NODE   5170.00 TO NODE   5215.00 =    5315.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      449.78   15.52    2.701  0.97( 0.31) 0.32     191.6    5043.00
     2      473.06   17.93    2.477  0.98( 0.30) 0.31     224.0    5080.00
     3      473.06   17.94    2.477  0.97( 0.30) 0.31     224.0    5050.00
     4      472.84   18.49    2.432  0.97( 0.30) 0.30     228.7    5142.00
     5      448.54   22.93    2.137  0.97( 0.28) 0.29     253.6    5025.00
     6      433.09   24.26    2.066  0.98( 0.28) 0.29     256.5    5070.00
     7      367.43   33.16    1.713  0.98( 0.27) 0.28     273.8    5000.00
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5215.00 =    9970.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      646.41   15.52    2.701  0.97( 0.24) 0.25     273.1    5043.00
     2      680.66   17.93    2.477  0.98( 0.24) 0.24     318.2    5080.00
     3      680.67   17.94    2.477  0.98( 0.24) 0.24     318.2    5050.00
     4      682.84   18.49    2.432  0.98( 0.24) 0.24     325.8    5142.00
     5      676.11   22.93    2.137  0.97( 0.22) 0.23     374.0    5025.00
```

```
     6      665.47   24.26    2.066  0.98( 0.22) 0.22     383.8    5070.00
     7      649.69   28.19    1.888  0.98( 0.21) 0.22     412.1    5120.00
     8      629.62   30.51    1.800  0.98( 0.21) 0.22     422.4    5170.00
     9      597.62   33.16    1.713  0.98( 0.21) 0.22     427.5    5000.00
   TOTAL AREA(ACRES) =       427.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      682.84  Tc(MIN.) =   18.491
  EFFECTIVE AREA(ACRES) =    325.77  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.22
  TOTAL AREA(ACRES) =      427.5
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5215.00 =    9970.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5215.00 TO NODE   5215.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5215.00 TO NODE   5248.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.42  DOWNSTREAM(FEET) =   708.36
  FLOW LENGTH(FEET) =  1194.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  90.0 INCH PIPE IS  68.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.83
  ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     682.84
  PIPE TRAVEL TIME(MIN.) =   1.06    Tc(MIN.) =   19.55
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5248.00 =   11164.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5248.00 TO NODE   5248.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.352
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.92      0.98     0.100    32
  PUBLIC PARK                A        0.76      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.439
  SUBAREA AREA(ACRES) =    1.68      SUBAREA RUNOFF(CFS) =    2.91
  EFFECTIVE AREA(ACRES) =    327.45   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      429.2       PEAK FLOW RATE(CFS) =     682.84
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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



```
  FLOW PROCESS FROM NODE   5248.00 TO NODE   5248.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.352
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.10      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    2.23
  EFFECTIVE AREA(ACRES) =    328.55   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      430.3       PEAK FLOW RATE(CFS) =     682.84
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5248.00 TO NODE   5248.00 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.) =   19.55
  RAINFALL INTENSITY(INCH/HR) =   2.35
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.24
  EFFECTIVE STREAM AREA(ACRES) =     328.55
  TOTAL STREAM AREA(ACRES) =     430.29
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     682.84

****************************************************************************
  FLOW PROCESS FROM NODE   5220.00 TO NODE   5225.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   614.00
  ELEVATION DATA: UPSTREAM(FEET) =    751.70  DOWNSTREAM(FEET) =    750.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.068
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.865
  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.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        4.53      0.98     0.200    32   14.07
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     10.89
  TOTAL AREA(ACRES) =      4.53   PEAK FLOW RATE(CFS) =     10.89
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   5225.00 TO NODE   5230.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  750.20  DOWNSTREAM ELEVATION(FEET) =  745.90
 STREET LENGTH(FEET) =   345.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      27.60
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.53
   HALFSTREET FLOOD WIDTH(FEET) =   18.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.75
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.00
 STREET FLOW TRAVEL TIME(MIN.) =   1.53   Tc(MIN.) =   15.60
 * 100 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
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       A       14.86      0.98     0.200    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =   14.86      SUBAREA RUNOFF(CFS) =   33.40
 EFFECTIVE AREA(ACRES) =     19.39    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =       19.4        PEAK FLOW RATE(CFS) =      43.59

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =  18.00
 FLOW VELOCITY(FEET/SEC.) =  4.50   DEPTH*VELOCITY(FT*FT/SEC.) =   2.68
 LONGEST FLOWPATH FROM NODE   5220.00 TO NODE   5230.00 =     959.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5230.00 TO NODE   5235.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   738.90  DOWNSTREAM(FEET) =   738.10
 FLOW LENGTH(FEET) =   265.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.2 INCHES
```



```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.10
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      43.59
 PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   16.33
 LONGEST FLOWPATH FROM NODE   5220.00 TO NODE   5235.00 =    1224.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5235.00 TO NODE   5235.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.33
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.620
 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        7.86      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    7.86      SUBAREA RUNOFF(CFS) =   12.67
 EFFECTIVE AREA(ACRES) =     27.25   AREA-AVERAGED Fm(INCH/HR) =  0.38
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.39
 TOTAL AREA(ACRES) =       27.2       PEAK FLOW RATE(CFS) =      55.00

****************************************************************************
 FLOW PROCESS FROM NODE   5235.00 TO NODE   5240.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   738.10  DOWNSTREAM(FEET) =   733.00
 FLOW LENGTH(FEET) =   514.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.05
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      55.00
 PIPE TRAVEL TIME(MIN.) =   0.85    Tc(MIN.) =   17.18
 LONGEST FLOWPATH FROM NODE   5220.00 TO NODE   5240.00 =    1738.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5240.00 TO NODE   5240.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.18
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.541
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                A        5.55      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    5.55      SUBAREA RUNOFF(CFS) =   12.21
 EFFECTIVE AREA(ACRES) =     32.80   AREA-AVERAGED Fm(INCH/HR) =  0.33
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.34
```

```
  TOTAL AREA(ACRES) =       32.8       PEAK FLOW RATE(CFS) =      65.27

****************************************************************************
  FLOW PROCESS FROM NODE   5240.00 TO NODE   5247.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   733.00  DOWNSTREAM(FEET) =   717.05
  FLOW LENGTH(FEET) =   800.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.53
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      65.27
  PIPE TRAVEL TIME(MIN.) =   0.99    Tc(MIN.) =   18.16
  LONGEST FLOWPATH FROM NODE   5220.00 TO NODE   5247.00 =    2538.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5247.00 TO NODE   5247.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.16
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.458
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       15.35      0.98     0.100    32
  PUBLIC PARK                A        3.86      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.251
  SUBAREA AREA(ACRES) =   19.21      SUBAREA RUNOFF(CFS) =   38.27
  EFFECTIVE AREA(ACRES) =     52.01   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =       52.0       PEAK FLOW RATE(CFS) =     101.07

****************************************************************************
  FLOW PROCESS FROM NODE   5247.00 TO NODE   5248.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   717.05  DOWNSTREAM(FEET) =   710.66
  FLOW LENGTH(FEET) =   950.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.07
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     101.07
  PIPE TRAVEL TIME(MIN.) =   1.57    Tc(MIN.) =   19.74
  LONGEST FLOWPATH FROM NODE   5220.00 TO NODE   5248.00 =    3488.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5248.00 TO NODE   5248.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```



```
============================================================================
  MAINLINE Tc(MIN.) =   19.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.338
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.56      0.98     0.100    32
  PUBLIC PARK                A        1.20      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.426
  SUBAREA AREA(ACRES) =    2.76      SUBAREA RUNOFF(CFS) =    4.78
  EFFECTIVE AREA(ACRES) =     54.77   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.31
  TOTAL AREA(ACRES) =       54.8       PEAK FLOW RATE(CFS) =     101.07
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5248.00 TO NODE   5248.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.338
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.56      0.98     0.100    32
  PUBLIC PARK                A        1.20      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.426
  SUBAREA AREA(ACRES) =    2.76      SUBAREA RUNOFF(CFS) =    4.78
  EFFECTIVE AREA(ACRES) =     57.53   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =       57.5       PEAK FLOW RATE(CFS) =     105.03

****************************************************************************
  FLOW PROCESS FROM NODE   5248.00 TO NODE   5248.00 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.) =   19.74
  RAINFALL INTENSITY(INCH/HR) =   2.34
  AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.32
  EFFECTIVE STREAM AREA(ACRES) =      57.53
  TOTAL STREAM AREA(ACRES) =      57.53
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     105.03

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

```
     1      646.41   16.60    2.594  0.97( 0.25) 0.25      275.9    5043.00
     1      680.66   18.99    2.393  0.98( 0.24) 0.25      321.0    5080.00
     1      680.67   18.99    2.393  0.98( 0.24) 0.25      321.0    5050.00
     1      682.84   19.55    2.352  0.97( 0.24) 0.24      328.6    5142.00
     1      676.11   23.99    2.080  0.97( 0.22) 0.23      376.8    5025.00
     1      665.47   25.34    2.013  0.97( 0.22) 0.22      386.6    5070.00
     1      649.69   29.27    1.846  0.98( 0.21) 0.22      414.9    5120.00
     1      629.62   31.59    1.763  0.98( 0.21) 0.22      425.1    5170.00
     1      597.62   34.26    1.680  0.98( 0.21) 0.22      430.3    5000.00
     2      105.03   19.74    2.338  0.97( 0.31) 0.32       57.5    5220.00

  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      745.89   16.60    2.594  0.97( 0.26) 0.26      324.3    5043.00
     2      784.45   18.99    2.393  0.98( 0.25) 0.26      376.3    5080.00
     3      784.46   18.99    2.393  0.97( 0.25) 0.26      376.3    5050.00
     4      787.56   19.55    2.352  0.97( 0.25) 0.25      385.5    5142.00
     5      787.58   19.74    2.338  0.98( 0.25) 0.25      388.1    5220.00
     6      767.75   23.99    2.080  0.97( 0.23) 0.24      434.3    5025.00
     7      753.64   25.34    2.013  0.97( 0.23) 0.24      444.2    5070.00
     8      729.23   29.27    1.846  0.98( 0.22) 0.23      472.4    5120.00
     9      704.87   31.59    1.763  0.98( 0.22) 0.23      482.7    5170.00
    10      668.54   34.26    1.680  0.98( 0.22) 0.23      487.8    5000.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     787.58    Tc(MIN.) =    19.74
  EFFECTIVE AREA(ACRES) =     388.13   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      487.8
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5248.00 =   11164.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5248.00 TO NODE   5300.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   708.36  DOWNSTREAM(FEET) =   707.99
  FLOW LENGTH(FEET) =    31.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  90.0 INCH PIPE IS  72.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.54
  ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     787.58
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   19.76
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5300.00 =   11195.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5300.00 TO NODE   5300.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   5273.00 TO NODE   5274.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   274.00
  ELEVATION DATA: UPSTREAM(FEET) =    737.00  DOWNSTREAM(FEET) =    735.88

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.623
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.843
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.46      0.98     0.100    32    8.62
  PUBLIC PARK                A        0.35      0.98     0.850    32   13.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.424
  SUBAREA RUNOFF(CFS) =      2.50
  TOTAL AREA(ACRES) =      0.81   PEAK FLOW RATE(CFS) =      2.50

****************************************************************************
  FLOW PROCESS FROM NODE   5274.00 TO NODE   5274.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.843
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.46      0.98     0.100    32
  PUBLIC PARK                A        0.35      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.424
  SUBAREA AREA(ACRES) =    0.81      SUBAREA RUNOFF(CFS) =    2.50
  EFFECTIVE AREA(ACRES) =      1.62   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       5.00

****************************************************************************
  FLOW PROCESS FROM NODE   5274.00 TO NODE   5275.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   725.22  DOWNSTREAM(FEET) =   722.55
  FLOW LENGTH(FEET) =   510.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.00
  PIPE TRAVEL TIME(MIN.) =   1.93    Tc(MIN.) =   10.55
```

```
 LONGEST FLOWPATH FROM NODE   5273.00 TO NODE   5275.00 =     784.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5275.00 TO NODE   5275.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.55
 RAINFALL INTENSITY(INCH/HR) =   3.40
 AREA-AVERAGED Fm(INCH/HR) =  0.41
 AREA-AVERAGED Fp(INCH/HR) =  0.97
 AREA-AVERAGED Ap =  0.42
 EFFECTIVE STREAM AREA(ACRES) =       1.62
 TOTAL STREAM AREA(ACRES) =       1.62
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.00

****************************************************************************
 FLOW PROCESS FROM NODE   5250.00 TO NODE   5255.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   502.00
 ELEVATION DATA: UPSTREAM(FEET) =    747.50  DOWNSTREAM(FEET) =    745.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.408
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.249
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 A        3.72      0.98     0.100    32   11.41
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =     10.55
 TOTAL AREA(ACRES) =      3.72   PEAK FLOW RATE(CFS) =     10.55

****************************************************************************
 FLOW PROCESS FROM NODE   5255.00 TO NODE   5260.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  745.80  DOWNSTREAM ELEVATION(FEET) =  741.80
 STREET LENGTH(FEET) =   615.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
```



```
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      23.06
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.55
  HALFSTREET FLOOD WIDTH(FEET) =   18.00
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.87
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.58
 STREET FLOW TRAVEL TIME(MIN.) =   3.57   Tc(MIN.) =   14.97
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.760
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A       10.38      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =   10.38      SUBAREA RUNOFF(CFS) =   24.87
 EFFECTIVE AREA(ACRES) =     14.10    AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       14.1        PEAK FLOW RATE(CFS) =      33.78

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.61   HALFSTREET FLOOD WIDTH(FEET) =  18.00
 FLOW VELOCITY(FEET/SEC.) =  3.35   DEPTH*VELOCITY(FT*FT/SEC.) =   2.04
 LONGEST FLOWPATH FROM NODE   5250.00 TO NODE   5260.00 =    1117.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5260.00 TO NODE   5265.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   734.40  DOWNSTREAM(FEET) =   733.30
 FLOW LENGTH(FEET) =   364.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.61
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      33.78
 PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   16.06
 LONGEST FLOWPATH FROM NODE   5250.00 TO NODE   5265.00 =    1481.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5265.00 TO NODE   5265.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.06
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.647
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        6.97      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    6.97      SUBAREA RUNOFF(CFS) =   15.99
  EFFECTIVE AREA(ACRES) =     21.07   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       21.1       PEAK FLOW RATE(CFS) =      48.34

****************************************************************************
  FLOW PROCESS FROM NODE   5265.00 TO NODE   5270.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   733.30  DOWNSTREAM(FEET) =   732.60
  FLOW LENGTH(FEET) =   183.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.66
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.34
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   16.51
  LONGEST FLOWPATH FROM NODE   5250.00 TO NODE   5270.00 =    1664.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5270.00 TO NODE   5270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.602
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        7.85      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    7.85      SUBAREA RUNOFF(CFS) =   17.70
  EFFECTIVE AREA(ACRES) =     28.92   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       28.9       PEAK FLOW RATE(CFS) =      65.19

****************************************************************************
  FLOW PROCESS FROM NODE   5270.00 TO NODE   5275.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   732.60  DOWNSTREAM(FEET) =   722.55
  FLOW LENGTH(FEET) =   322.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.93
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      65.19
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   16.85
  LONGEST FLOWPATH FROM NODE   5250.00 TO NODE   5275.00 =    1986.00 FEET.

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



```
  FLOW PROCESS FROM NODE   5275.00 TO NODE   5275.00 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.) =   16.85
  RAINFALL INTENSITY(INCH/HR) =   2.57
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      28.92
  TOTAL STREAM AREA(ACRES) =      28.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      65.19

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.00   10.55    3.405  0.97( 0.41) 0.42       1.6    5273.00
      2       65.19   16.85    2.571  0.98( 0.10) 0.10      28.9    5250.00

  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       59.58   10.55    3.405  0.98( 0.12) 0.13      19.7    5273.00
      2       68.80   16.85    2.571  0.98( 0.11) 0.12      30.5    5250.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      68.80    Tc(MIN.) =    16.85
  EFFECTIVE AREA(ACRES) =      30.54   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.12
  TOTAL AREA(ACRES) =       30.5
  LONGEST FLOWPATH FROM NODE   5250.00 TO NODE   5275.00 =    1986.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5275.00 TO NODE   5295.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   722.55  DOWNSTREAM(FEET) =   717.86
  FLOW LENGTH(FEET) =   722.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.04
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      68.80
  PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   18.18
  LONGEST FLOWPATH FROM NODE   5250.00 TO NODE   5295.00 =    2708.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5295.00 TO NODE   5295.00 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.) =   18.18
  RAINFALL INTENSITY(INCH/HR) =   2.46
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.12
  EFFECTIVE STREAM AREA(ACRES) =      30.54
  TOTAL STREAM AREA(ACRES) =      30.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      68.80

****************************************************************************
  FLOW PROCESS FROM NODE   5280.00 TO NODE   5285.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   556.00
  ELEVATION DATA: UPSTREAM(FEET) =    737.20  DOWNSTREAM(FEET) =    736.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.774
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.902
  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                A        1.60      0.98     0.850    32   21.88
  COMMERCIAL                 A        5.83      0.98     0.100    32   13.77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.262
  SUBAREA RUNOFF(CFS) =     17.70
  TOTAL AREA(ACRES) =      7.43   PEAK FLOW RATE(CFS) =     17.70

****************************************************************************
  FLOW PROCESS FROM NODE   5285.00 TO NODE   5290.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.30  DOWNSTREAM(FEET) =   728.30
  FLOW LENGTH(FEET) =   347.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.48
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.70
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   14.33
  LONGEST FLOWPATH FROM NODE   5280.00 TO NODE   5290.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5290.00 TO NODE   5290.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```



```
============================================================================
  MAINLINE Tc(MIN.) =   14.33
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.834
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        4.80      0.57     0.100    69
  PUBLIC PARK                A        7.67      0.98     0.850    32
  COMMERCIAL                 A        8.90      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.95
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.369
  SUBAREA AREA(ACRES) =   21.37      SUBAREA RUNOFF(CFS) =   47.76
  EFFECTIVE AREA(ACRES) =     28.80   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       28.8       PEAK FLOW RATE(CFS) =      65.01

****************************************************************************
  FLOW PROCESS FROM NODE   5290.00 TO NODE   5295.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   728.30  DOWNSTREAM(FEET) =   724.50
  FLOW LENGTH(FEET) =   374.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.63
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      65.01
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   14.91
  LONGEST FLOWPATH FROM NODE   5280.00 TO NODE   5295.00 =    1277.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5295.00 TO NODE   5295.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.91
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.767
  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        0.32      0.57     0.850    69
  COMMERCIAL                 C        3.80      0.57     0.100    69
  COMMERCIAL                 A        6.20      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.77
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.123
  SUBAREA AREA(ACRES) =   10.32      SUBAREA RUNOFF(CFS) =   24.82
  EFFECTIVE AREA(ACRES) =     39.12   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.93  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =       39.1       PEAK FLOW RATE(CFS) =      88.08

****************************************************************************
  FLOW PROCESS FROM NODE   5295.00 TO NODE   5295.00 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.) =   14.91
 RAINFALL INTENSITY(INCH/HR) =   2.77
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.93
 AREA-AVERAGED Ap =  0.28
 EFFECTIVE STREAM AREA(ACRES) =      39.12
 TOTAL STREAM AREA(ACRES) =      39.12
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      88.08

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       59.58   11.94    3.161  0.98( 0.12) 0.13      19.7    5273.00
     1       68.80   18.18    2.456  0.98( 0.11) 0.12      30.5    5250.00
     2       88.08   14.91    2.767  0.93( 0.26) 0.28      39.1    5280.00

 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      141.24   11.94    3.161  0.94( 0.21) 0.22      51.1    5273.00
     2      152.05   14.91    2.767  0.94( 0.21) 0.22      64.0    5280.00
     3      145.95   18.18    2.456  0.94( 0.20) 0.21      69.7    5250.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     152.05    Tc(MIN.) =    14.91
 EFFECTIVE AREA(ACRES) =      63.99   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.22
 TOTAL AREA(ACRES) =       69.7
 LONGEST FLOWPATH FROM NODE   5250.00 TO NODE   5295.00 =    2708.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5295.00 TO NODE   5300.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   717.86  DOWNSTREAM(FEET) =   710.30
 FLOW LENGTH(FEET) =   921.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.03
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     152.05
 PIPE TRAVEL TIME(MIN.) =   1.28    Tc(MIN.) =   16.19
 LONGEST FLOWPATH FROM NODE   5250.00 TO NODE   5300.00 =    3629.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5300.00 TO NODE   5300.00 IS CODE =  81
----------------------------------------------------------------------------
```



```
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.19
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.634
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        1.50      0.57     0.100    69
 PUBLIC PARK                C        1.16      0.57     0.850    69
 COMMERCIAL                 A        1.58      0.98     0.100    32
 PUBLIC PARK                A        1.22      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.427
 SUBAREA AREA(ACRES) =    5.46      SUBAREA RUNOFF(CFS) =   11.31
 EFFECTIVE AREA(ACRES) =     69.45   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.92  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =       75.1       PEAK FLOW RATE(CFS) =     152.05
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5300.00 TO NODE   5300.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.19
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.634
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        1.46      0.57     0.100    69
 PUBLIC PARK                C        1.12      0.57     0.850    69
 COMMERCIAL                 A        1.64      0.98     0.100    32
 PUBLIC PARK                A        1.26      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.426
 SUBAREA AREA(ACRES) =    5.48      SUBAREA RUNOFF(CFS) =   11.35
 EFFECTIVE AREA(ACRES) =     74.93   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.90  AREA-AVERAGED Ap =  0.25
 TOTAL AREA(ACRES) =       80.6       PEAK FLOW RATE(CFS) =     162.35

****************************************************************************
 FLOW PROCESS FROM NODE   5300.00 TO NODE   5300.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      152.71   13.26    2.969  0.89( 0.23) 0.26      62.0    5273.00
     2      162.35   16.19    2.634  0.90( 0.23) 0.25      74.9    5280.00
     3      155.29   19.47    2.358  0.90( 0.22) 0.24      80.6    5250.00
 LONGEST FLOWPATH FROM NODE   5250.00 TO NODE   5300.00 =    3629.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	745.89	16.63	2.592	0.97(0.26)	0.26	324.3	5043.00
2	784.45	19.02	2.391	0.98(0.25)	0.26	376.3	5080.00
3	784.46	19.02	2.391	0.97(0.25)	0.26	376.3	5050.00
4	787.56	19.57	2.350	0.97(0.25)	0.25	385.5	5142.00
5	787.58	19.76	2.337	0.98(0.25)	0.25	388.1	5220.00
6	767.75	24.02	2.079	0.97(0.23)	0.24	434.3	5025.00
7	753.64	25.37	2.011	0.97(0.23)	0.24	444.2	5070.00
8	729.23	29.29	1.845	0.98(0.22)	0.23	472.4	5120.00
9	704.87	31.62	1.762	0.98(0.22)	0.23	482.7	5170.00
10	668.54	34.29	1.679	0.98(0.22)	0.23	487.8	5000.00

LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5300.00 = 11195.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	843.48	13.26	2.969	0.96(0.25)	0.26	320.6	5273.00
2	901.58	16.19	2.634	0.96(0.25)	0.26	390.6	5280.00
3	907.30	16.63	2.592	0.96(0.25)	0.26	400.0	5043.00
4	940.71	19.02	2.391	0.96(0.24)	0.25	456.1	5080.00
5	940.72	19.02	2.391	0.96(0.24)	0.25	456.2	5050.00
6	942.26	19.47	2.358	0.96(0.24)	0.25	464.4	5250.00
7	942.29	19.57	2.350	0.96(0.24)	0.25	466.1	5142.00
8	941.34	19.76	2.337	0.96(0.24)	0.25	468.7	5220.00
9	902.79	24.02	2.079	0.96(0.23)	0.24	514.9	5025.00
10	883.81	25.37	2.011	0.96(0.23)	0.24	524.8	5070.00
11	847.33	29.29	1.845	0.96(0.22)	0.23	553.0	5120.00
12	816.98	31.62	1.762	0.96(0.22)	0.23	563.3	5170.00
13	774.58	34.29	1.679	0.96(0.22)	0.23	568.4	5000.00

TOTAL AREA(ACRES) = 568.4

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 942.29 Tc(MIN.) = 19.573
EFFECTIVE AREA(ACRES) = 466.13 AREA-AVERAGED Fm(INCH/HR) = 0.24
AREA-AVERAGED Fp(INCH/HR) = 0.96 AREA-AVERAGED Ap = 0.25
TOTAL AREA(ACRES) = 568.4
LONGEST FLOWPATH FROM NODE 5000.00 TO NODE 5300.00 = 11195.00 FEET.

```
****************************************************************************
  FLOW PROCESS FROM NODE   5300.00 TO NODE   5300.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5300.00 TO NODE   5305.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   707.90  DOWNSTREAM(FEET) =   704.64
  FLOW LENGTH(FEET) =   652.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 114.0 INCH PIPE IS  90.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.56
```



```
  ESTIMATED PIPE DIAMETER(INCH) = 114.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     942.29
  PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =   20.27
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5305.00 =   11847.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5305.00 TO NODE   5305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.301
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        9.55      0.57     0.100    69
  COMMERCIAL                 A       11.87      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   21.42      SUBAREA RUNOFF(CFS) =   42.83
  EFFECTIVE AREA(ACRES) =    487.55   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      589.8       PEAK FLOW RATE(CFS) =     942.29
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5305.00 TO NODE   5305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.301
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.54      0.57     0.100    69
  PUBLIC PARK                C        0.41      0.57     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.424
  SUBAREA AREA(ACRES) =    0.95      SUBAREA RUNOFF(CFS) =    1.76
  EFFECTIVE AREA(ACRES) =    488.50   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      590.8       PEAK FLOW RATE(CFS) =     942.29
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5305.00 TO NODE   5330.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   704.64  DOWNSTREAM(FEET) =   701.26
  FLOW LENGTH(FEET) =   675.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 114.0 INCH PIPE IS  90.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.57
```

```
  ESTIMATED PIPE DIAMETER(INCH) = 114.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     942.29
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   20.99
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5330.00 =   12522.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5330.00 TO NODE   5330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.253
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.54      0.57     0.100    69
  PUBLIC PARK                C        0.41      0.57     0.850    69
  COMMERCIAL                 A        0.51      0.98     0.100    32
  PUBLIC PARK                A        0.48      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.444
  SUBAREA AREA(ACRES) =    1.94      SUBAREA RUNOFF(CFS) =    3.33
  EFFECTIVE AREA(ACRES) =    490.44   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      592.7       PEAK FLOW RATE(CFS) =     942.29
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5330.00 TO NODE   5330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.253
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.51      0.98     0.100    32
  PUBLIC PARK                A        0.48      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.464
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    1.60
  EFFECTIVE AREA(ACRES) =    491.43   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.25
  TOTAL AREA(ACRES) =      593.7       PEAK FLOW RATE(CFS) =     942.29
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5330.00 TO NODE   5330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.253
  SUBAREA LOSS RATE DATA(AMC  II):
```



```
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       23.78      0.98     0.100    32
  COMMERCIAL                 C        5.56      0.57     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.90
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   29.34      SUBAREA RUNOFF(CFS) =   57.13
  EFFECTIVE AREA(ACRES) =    520.77   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.24
  TOTAL AREA(ACRES) =      623.1       PEAK FLOW RATE(CFS) =     949.30

****************************************************************************
  FLOW PROCESS FROM NODE   5330.00 TO NODE   5330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.253
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       32.80      0.98     0.100    32
  COMMERCIAL                 C        4.08      0.57     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.93
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   36.88      SUBAREA RUNOFF(CFS) =   71.70
  EFFECTIVE AREA(ACRES) =    557.65   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =      659.9       PEAK FLOW RATE(CFS) =    1021.01

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      954.61   14.70    2.791  0.95( 0.22) 0.23     412.1    5273.00
      2      990.46   17.61    2.504  0.95( 0.22) 0.23     482.2    5280.00
      3      993.22   18.05    2.467  0.95( 0.22) 0.23     491.5    5043.00
      4     1020.30   20.44    2.290  0.96( 0.22) 0.23     547.7    5080.00
      5     1020.30   20.44    2.290  0.96( 0.22) 0.23     547.7    5050.00
      6     1021.15   20.89    2.260  0.96( 0.22) 0.23     555.9    5250.00
      7     1021.01   20.99    2.253  0.96( 0.22) 0.23     557.7    5142.00
      8     1019.80   21.18    2.241  0.96( 0.22) 0.23     560.2    5220.00
      9      980.89   25.44    2.008  0.96( 0.21) 0.22     606.4    5025.00
     10      963.41   26.80    1.946  0.96( 0.21) 0.22     616.3    5070.00
     11      920.53   30.73    1.793  0.96( 0.21) 0.22     644.5    5120.00
     12      889.79   33.09    1.715  0.96( 0.20) 0.21     654.8    5170.00
     13      850.40   35.77    1.637  0.96( 0.21) 0.21     659.9    5000.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =    1021.15  Tc(MIN.) =   20.89
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.96
  AREA-AVERAGED Ap =  0.23  EFFECTIVE AREA(ACRES) =     555.88

****************************************************************************
  FLOW PROCESS FROM NODE   5330.00 TO NODE   5330.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>PEAK FLOW RATE ESTIMATOR CHANGED TO UNIT-HYDROGRAPH METHOD<<<<<
```

```
  >>>>>USING TIME-OF-CONCENTRATION OF LONGEST FLOWPATH<<<<<
================================================================================
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.60; LAG(HR) = 0.48; Fm(INCH/HR) = 0.21; Ybar = 0.24
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;
  3HR = 1.00; 6HR = 1.00; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =      659.9
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5330.00 =   12522.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0337; Lca/L=0.4,n=.0302; Lca/L=0.5,n=.0277;Lca/L=0.6,n=.0259
  TIME OF PEAK FLOW(HR) = 16.50  RUNOFF VOLUME(AF) =     257.40
  UNIT-HYDROGRAPH METHOD PEAK FLOW RATE(CFS) =    914.56
  TOTAL PEAK FLOW RATE(CFS) =    914.56 (SOURCE FLOW INCLUDED)
  RATIONAL METHOD PEAK FLOW RATE(CFS) =   1021.15
   (UPSTREAM NODE PEAK FLOW RATE(CFS) =   1021.15)
  PEAK FLOW RATE(CFS) USED =   1021.15

****************************************************************************
  FLOW PROCESS FROM NODE   5330.00 TO NODE   5335.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   701.26  DOWNSTREAM(FEET) =   697.78
  FLOW LENGTH(FEET) =   687.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 120.0 INCH PIPE IS  90.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.12
  ESTIMATED PIPE DIAMETER(INCH) = 120.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1021.15
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   36.48
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5335.00 =   13209.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5335.00 TO NODE   5335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   36.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.618
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.54      0.98     0.100    32
  PUBLIC PARK                A        0.50      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.461
  SUBAREA AREA(ACRES) =    1.04
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
```



```
  Tc(HR) = 0.61; LAG(HR) = 0.49; Fm(INCH/HR) = 0.21; Ybar = 0.24
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;
  3HR = 1.00; 6HR = 1.00; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =      661.0
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5335.00 =   13209.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0329; Lca/L=0.4,n=.0295; Lca/L=0.5,n=.0271;Lca/L=0.6,n=.0252
  TIME OF PEAK FLOW(HR) = 16.50  RUNOFF VOLUME(AF) =     257.69
  UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) =     897.46
  TOTAL AREA(ACRES) =      661.0       PEAK FLOW RATE(CFS) =    1021.15
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5335.00 TO NODE   5335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   36.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.618
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.54      0.98     0.100    32
  PUBLIC PARK                A        0.50      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.461
  SUBAREA AREA(ACRES) =    1.04
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.61; LAG(HR) = 0.49; Fm(INCH/HR) = 0.21; Ybar = 0.24
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;
  3HR = 1.00; 6HR = 1.00; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =      662.0
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5335.00 =   13209.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0329; Lca/L=0.4,n=.0295; Lca/L=0.5,n=.0271;Lca/L=0.6,n=.0252
  TIME OF PEAK FLOW(HR) = 16.50  RUNOFF VOLUME(AF) =     257.98
  UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) =     898.62
  TOTAL AREA(ACRES) =      662.0       PEAK FLOW RATE(CFS) =    1021.15
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5335.00 TO NODE   5335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   36.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.618
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        1.40      0.57     0.200    69
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       17.88      0.98     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.95
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   19.28
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.61; LAG(HR) = 0.49; Fm(INCH/HR) = 0.21; Ybar = 0.24
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;
  3HR = 1.00; 6HR = 1.00; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =      681.3
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5335.00 =   13209.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0329; Lca/L=0.4,n=.0295; Lca/L=0.5,n=.0271;Lca/L=0.6,n=.0252
  TIME OF PEAK FLOW(HR) = 16.50  RUNOFF VOLUME(AF) =     265.62
  UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) =     924.20
  TOTAL AREA(ACRES) =      681.3       PEAK FLOW RATE(CFS) =    1021.15
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5335.00 TO NODE   5375.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   697.79  DOWNSTREAM(FEET) =   682.26
  FLOW LENGTH(FEET) =  1386.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  79.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.59
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1021.15
  PIPE TRAVEL TIME(MIN.) =   1.07    Tc(MIN.) =   37.55
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5375.00 =   14595.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5375.00 TO NODE   5375.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  PEAK FLOW RATE(CFS) =    1021.15    Tc(MIN.) =   37.55
  AREA-AVERAGED Fm(INCH/HR) =  0.21   Ybar = 0.24
  TOTAL AREA(ACRES) =      681.3

****************************************************************************
  FLOW PROCESS FROM NODE   5355.00 TO NODE   5360.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```



```
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   410.00
  ELEVATION DATA: UPSTREAM(FEET) =    717.00  DOWNSTREAM(FEET) =    712.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.212
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.975
  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                A        2.36      0.98     0.850    32   13.21
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      4.56
  TOTAL AREA(ACRES) =      2.36   PEAK FLOW RATE(CFS) =      4.56

****************************************************************************
  FLOW PROCESS FROM NODE   5360.00 TO NODE   5365.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  712.50  DOWNSTREAM ELEVATION(FEET) =  710.30
  STREET LENGTH(FEET) =   394.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.27
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   13.55
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.88
  STREET FLOW TRAVEL TIME(MIN.) =   3.22   Tc(MIN.) =   16.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.611
  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        4.61      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    4.61      SUBAREA RUNOFF(CFS) =    7.39
  EFFECTIVE AREA(ACRES) =      6.97    AREA-AVERAGED Fm(INCH/HR) =  0.83
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        7.0        PEAK FLOW RATE(CFS) =      11.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
```

```
  DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  15.33
  FLOW VELOCITY(FEET/SEC.) =  2.20   DEPTH*VELOCITY(FT*FT/SEC.) =   1.02
  LONGEST FLOWPATH FROM NODE   5355.00 TO NODE   5365.00 =     804.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5365.00 TO NODE   5370.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   703.30  DOWNSTREAM(FEET) =   702.40
  FLOW LENGTH(FEET) =   287.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.34
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.18
  PIPE TRAVEL TIME(MIN.) =   1.10    Tc(MIN.) =   17.53
  LONGEST FLOWPATH FROM NODE   5355.00 TO NODE   5370.00 =    1091.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5370.00 TO NODE   5370.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.53
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.511
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        6.55      0.57     0.500    69
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        5.60      0.98     0.500    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.15      SUBAREA RUNOFF(CFS) =   23.33
  EFFECTIVE AREA(ACRES) =     19.12   AREA-AVERAGED Fm(INCH/HR) =  0.54
  AREA-AVERAGED Fp(INCH/HR) =  0.86  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =       19.1       PEAK FLOW RATE(CFS) =      33.88

****************************************************************************
  FLOW PROCESS FROM NODE   5370.00 TO NODE   5375.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   702.40  DOWNSTREAM(FEET) =   685.59
  FLOW LENGTH(FEET) =   917.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.23
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.88
  PIPE TRAVEL TIME(MIN.) =   1.36    Tc(MIN.) =   18.89
  LONGEST FLOWPATH FROM NODE   5355.00 TO NODE   5375.00 =    2008.00 FEET.
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   5375.00 TO NODE   5375.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.89
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.401
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        9.45      0.57     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    9.45      SUBAREA RUNOFF(CFS) =   18.01
  EFFECTIVE AREA(ACRES) =     28.57   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.78  AREA-AVERAGED Ap =  0.59
  TOTAL AREA(ACRES) =       28.6       PEAK FLOW RATE(CFS) =      50.00

****************************************************************************
  FLOW PROCESS FROM NODE   5375.00 TO NODE   5375.00 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.) =   18.89
  RAINFALL INTENSITY(INCH/HR) =   2.40
  AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.78
  AREA-AVERAGED Ap =  0.59
  EFFECTIVE STREAM AREA(ACRES) =      28.57
  TOTAL STREAM AREA(ACRES) =      28.57
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      50.00
  ** CONFLUENCE DATA **
  STREAM      Q        Tc      AREA      HEADWATER
  NUMBER    (CFS)    (MIN.)   (ACRES)      NODE
     1     1021.15   37.55      681.30     5000.00
     2       50.00   18.89       28.57     5355.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.63; LAG(HR) = 0.50; Fm(INCH/HR) = 0.22; Ybar = 0.25
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;
  3HR = 1.00; 6HR = 1.00; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =      709.9
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5375.00 =   14595.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0314; Lca/L=0.4,n=.0281; Lca/L=0.5,n=.0258;Lca/L=0.6,n=.0241
  TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =     273.63
```

```
  PEAK FLOW RATE(CFS) =     949.39
    (UPSTREAM NODE PEAK FLOW RATE(CFS) =    1021.15)
  PEAK FLOW RATE(CFS) USED =    1021.15

****************************************************************************
  FLOW PROCESS FROM NODE   5375.00 TO NODE   5383.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   682.26  DOWNSTREAM(FEET) =   676.82
  FLOW LENGTH(FEET) =   526.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  82.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.78
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1021.15
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   37.97
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5383.00 =   15121.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5383.00 TO NODE   5383.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   37.97
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.579
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        1.31      0.57     0.100    69
  PUBLIC PARK                C        1.23      0.57     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.463
  SUBAREA AREA(ACRES) =    2.54
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.63; LAG(HR) = 0.51; Fm(INCH/HR) = 0.22; Ybar = 0.25
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;
  3HR = 1.00; 6HR = 1.00; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =      712.4
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5383.00 =   15121.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0311; Lca/L=0.4,n=.0279; Lca/L=0.5,n=.0256;Lca/L=0.6,n=.0239
  TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =     274.58
  UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) =     949.92
  TOTAL AREA(ACRES) =      712.4       PEAK FLOW RATE(CFS) =    1021.15
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5383.00 TO NODE   5383.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```



```
============================================================================
  MAINLINE Tc(MIN.) =   37.97
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.579
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        1.31      0.57     0.100    69
  PUBLIC PARK                C        1.23      0.57     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.463
  SUBAREA AREA(ACRES) =    2.54
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.63; LAG(HR) = 0.51; Fm(INCH/HR) = 0.22; Ybar = 0.25
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.97; 30M = 0.97; 1HR = 0.97;
  3HR = 1.00; 6HR = 1.00; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =      715.0
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5383.00 =   15121.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0311; Lca/L=0.4,n=.0279; Lca/L=0.5,n=.0256;Lca/L=0.6,n=.0239
  TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =     275.52
  UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) =     953.11
  TOTAL AREA(ACRES) =      715.0       PEAK FLOW RATE(CFS) =    1021.15
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5383.00 TO NODE   5383.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  PEAK FLOW RATE(CFS) =    1021.15    Tc(MIN.) =   37.97
  AREA-AVERAGED Fm(INCH/HR) =  0.22   Ybar = 0.25
  TOTAL AREA(ACRES) =      715.0

****************************************************************************
  FLOW PROCESS FROM NODE   5380.00 TO NODE   5381.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   594.00
  ELEVATION DATA: UPSTREAM(FEET) =    702.90  DOWNSTREAM(FEET) =    700.51

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.789
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.186
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.54      0.98     0.100    32   11.79
```

```
  PUBLIC PARK                A        0.45      0.98     0.850    32   18.73
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.441
  SUBAREA RUNOFF(CFS) =      2.46
  TOTAL AREA(ACRES) =      0.99   PEAK FLOW RATE(CFS) =      2.46

****************************************************************************
  FLOW PROCESS FROM NODE   5381.00 TO NODE   5381.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.186
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.54      0.98     0.100    32
  PUBLIC PARK                A        0.45      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.441
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    2.46
  EFFECTIVE AREA(ACRES) =      1.98   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        2.0       PEAK FLOW RATE(CFS) =       4.91

****************************************************************************
  FLOW PROCESS FROM NODE   5381.00 TO NODE   5382.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   690.51  DOWNSTREAM(FEET) =   685.38
  FLOW LENGTH(FEET) =  1020.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.32
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.91
  PIPE TRAVEL TIME(MIN.) =   3.94    Tc(MIN.) =   15.72
  LONGEST FLOWPATH FROM NODE   5380.00 TO NODE   5382.00 =    1614.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5382.00 TO NODE   5382.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.72
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.680
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        1.20      0.57     0.100    69
  PUBLIC PARK                C        1.00      0.57     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.441
  SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    4.81
```



```
  EFFECTIVE AREA(ACRES) =      4.18   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.76  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =       8.82

****************************************************************************
  FLOW PROCESS FROM NODE   5382.00 TO NODE   5382.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.72
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.680
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        1.20      0.57     0.100    69
  PUBLIC PARK                C        1.00      0.57     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.441
  SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    4.81
  EFFECTIVE AREA(ACRES) =      6.38   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.69  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        6.4       PEAK FLOW RATE(CFS) =      13.63

****************************************************************************
  FLOW PROCESS FROM NODE   5382.00 TO NODE   5383.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   685.38  DOWNSTREAM(FEET) =   680.32
  FLOW LENGTH(FEET) =   770.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.13
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.63
  PIPE TRAVEL TIME(MIN.) =   2.09    Tc(MIN.) =   17.82
  LONGEST FLOWPATH FROM NODE   5380.00 TO NODE   5383.00 =    2384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5383.00 TO NODE   5383.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.486
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.47      0.57     0.100    69
  PUBLIC PARK                C        0.39      0.57     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.440
  SUBAREA AREA(ACRES) =    0.86      SUBAREA RUNOFF(CFS) =    1.73
  EFFECTIVE AREA(ACRES) =      7.24   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.68  AREA-AVERAGED Ap =  0.44
```

```
  TOTAL AREA(ACRES) =        7.2       PEAK FLOW RATE(CFS) =      14.25

****************************************************************************
  FLOW PROCESS FROM NODE   5383.00 TO NODE   5383.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.486
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.47      0.57     0.100    69
  PUBLIC PARK                C        0.39      0.57     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.440
  SUBAREA AREA(ACRES) =    0.86      SUBAREA RUNOFF(CFS) =    1.73
  EFFECTIVE AREA(ACRES) =      8.10   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.67  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =        8.1       PEAK FLOW RATE(CFS) =      15.98

****************************************************************************
  FLOW PROCESS FROM NODE   5383.00 TO NODE   5383.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.486
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       30.37      0.98     0.200    32
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C       45.30      0.57     0.200    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.73
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   75.67      SUBAREA RUNOFF(CFS) =  159.38
  EFFECTIVE AREA(ACRES) =     83.77   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.72  AREA-AVERAGED Ap =  0.22
  TOTAL AREA(ACRES) =       83.8       PEAK FLOW RATE(CFS) =     175.36

****************************************************************************
  FLOW PROCESS FROM NODE   5383.00 TO NODE   5383.00 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.) =   17.82
  RAINFALL INTENSITY(INCH/HR) =   2.49
  AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.72
  AREA-AVERAGED Ap =  0.22
```



```
  EFFECTIVE STREAM AREA(ACRES) =      83.77
  TOTAL STREAM AREA(ACRES) =      83.77
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     175.36
  ** CONFLUENCE DATA **
  STREAM      Q        Tc      AREA      HEADWATER
  NUMBER    (CFS)    (MIN.)   (ACRES)      NODE
     1      1021.15   37.97      714.95     5000.00
     2       175.36   17.82       83.77     5380.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.63; LAG(HR) = 0.51; Fm(INCH/HR) = 0.21; Ybar = 0.24
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
  3HR = 0.99; 6HR = 1.00; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =      798.7
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5383.00 =   15121.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0309; Lca/L=0.4,n=.0277; Lca/L=0.5,n=.0255;Lca/L=0.6,n=.0238
  TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =     309.93
  PEAK FLOW RATE(CFS) =    1064.45

****************************************************************************
  FLOW PROCESS FROM NODE   5383.00 TO NODE   5425.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   676.82  DOWNSTREAM(FEET) =   676.55
  FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 114.0 INCH PIPE IS  86.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.47
  ESTIMATED PIPE DIAMETER(INCH) = 114.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1064.45
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   38.00
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5425.00 =   15159.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5425.00 TO NODE   5425.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5048.00 TO NODE   5049.00 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) =    704.37  DOWNSTREAM(FEET) =    703.86
```

```
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.356
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.916
 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        0.17      0.57     0.100    69    8.36
 PUBLIC PARK                C        0.13      0.57     0.850    69   13.28
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.425
 SUBAREA RUNOFF(CFS) =      0.99
 TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      0.99

****************************************************************************
 FLOW PROCESS FROM NODE   5049.00 TO NODE   5049.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.36
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.916
 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      0.57     0.100    69
 PUBLIC PARK                C        0.12      0.57     0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.433
 SUBAREA AREA(ACRES) =    0.27      SUBAREA RUNOFF(CFS) =    0.89
 EFFECTIVE AREA(ACRES) =      0.57   AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  0.43
 TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       1.88

****************************************************************************
 FLOW PROCESS FROM NODE   5049.00 TO NODE   5410.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   694.03  DOWNSTREAM(FEET) =   692.13
 FLOW LENGTH(FEET) =   431.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.23
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.88
 PIPE TRAVEL TIME(MIN.) =   2.23    Tc(MIN.) =   10.58
 LONGEST FLOWPATH FROM NODE   5048.00 TO NODE   5410.00 =     631.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5410.00 TO NODE   5410.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.58
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.399
```



```
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.27      0.98     0.100    32
 PUBLIC PARK                A        0.27      0.98     0.850    32
 COMMERCIAL                 C        0.27      0.57     0.100    69
 PUBLIC PARK                C        0.27      0.57     0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.77
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA AREA(ACRES) =    1.08      SUBAREA RUNOFF(CFS) =    2.95
 EFFECTIVE AREA(ACRES) =      1.65   AREA-AVERAGED Fm(INCH/HR) =  0.32
 AREA-AVERAGED Fp(INCH/HR) =  0.70  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       4.57

****************************************************************************
 FLOW PROCESS FROM NODE   5410.00 TO NODE   5410.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.58
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.399
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.27      0.98     0.100    32
 PUBLIC PARK                A        0.26      0.98     0.850    32
 COMMERCIAL                 C        0.26      0.57     0.100    69
 PUBLIC PARK                C        0.26      0.57     0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.77
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.471
 SUBAREA AREA(ACRES) =    1.05      SUBAREA RUNOFF(CFS) =    2.87
 EFFECTIVE AREA(ACRES) =      2.70   AREA-AVERAGED Fm(INCH/HR) =  0.34
 AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.46
 TOTAL AREA(ACRES) =        2.7       PEAK FLOW RATE(CFS) =       7.44

****************************************************************************
 FLOW PROCESS FROM NODE   5410.00 TO NODE   5410.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.58
 RAINFALL INTENSITY(INCH/HR) =   3.40
 AREA-AVERAGED Fm(INCH/HR) =  0.34
 AREA-AVERAGED Fp(INCH/HR) =  0.73
 AREA-AVERAGED Ap =  0.46
 EFFECTIVE STREAM AREA(ACRES) =       2.70
 TOTAL STREAM AREA(ACRES) =       2.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.44

****************************************************************************
 FLOW PROCESS FROM NODE   5400.00 TO NODE   5405.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   295.00
  ELEVATION DATA: UPSTREAM(FEET) =    709.30  DOWNSTREAM(FEET) =    707.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.879
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.343
  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.)
  SCHOOL                     C        1.07      0.57     0.600    69   10.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =      2.89
  TOTAL AREA(ACRES) =      1.07   PEAK FLOW RATE(CFS) =      2.89

****************************************************************************
  FLOW PROCESS FROM NODE   5405.00 TO NODE   5410.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  707.30  DOWNSTREAM ELEVATION(FEET) =  703.70
  STREET LENGTH(FEET) =   240.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  12.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.90
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   10.08
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.03
  STREET FLOW TRAVEL TIME(MIN.) =   1.40   Tc(MIN.) =   12.28
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.109
  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        0.72      0.98     0.850    32
  PUBLIC PARK                A        3.17      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.89      SUBAREA RUNOFF(CFS) =    7.98
  EFFECTIVE AREA(ACRES) =      4.96    AREA-AVERAGED Fm(INCH/HR) =  0.72
  AREA-AVERAGED Fp(INCH/HR) =  0.91  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =        5.0        PEAK FLOW RATE(CFS) =      10.65
```



```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  12.23
  FLOW VELOCITY(FEET/SEC.) =  3.16   DEPTH*VELOCITY(FT*FT/SEC.) =   1.27
  LONGEST FLOWPATH FROM NODE   5400.00 TO NODE   5410.00 =     535.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5410.00 TO NODE   5410.00 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.) =   12.28
  RAINFALL INTENSITY(INCH/HR) =   3.11
  AREA-AVERAGED Fm(INCH/HR) =  0.72
  AREA-AVERAGED Fp(INCH/HR) =  0.91
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =       4.96
  TOTAL STREAM AREA(ACRES) =       4.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.65

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        7.44   10.58    3.399  0.73( 0.34) 0.46       2.7    5048.00
      2       10.65   12.28    3.109  0.91( 0.72) 0.80       5.0    5400.00

  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       17.73   10.58    3.399  0.86( 0.57) 0.67       7.0    5048.00
      2       17.38   12.28    3.109  0.87( 0.59) 0.68       7.7    5400.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      17.73    Tc(MIN.) =    10.58
  EFFECTIVE AREA(ACRES) =       6.98   AREA-AVERAGED Fm(INCH/HR) =  0.57
  AREA-AVERAGED Fp(INCH/HR) =  0.86  AREA-AVERAGED Ap =  0.67
  TOTAL AREA(ACRES) =        7.7
  LONGEST FLOWPATH FROM NODE   5048.00 TO NODE   5410.00 =     631.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5410.00 TO NODE   5411.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.13  DOWNSTREAM(FEET) =   690.07
  FLOW LENGTH(FEET) =   544.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.18
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.73
 PIPE TRAVEL TIME(MIN.) =   1.75    Tc(MIN.) =   12.33
 LONGEST FLOWPATH FROM NODE   5048.00 TO NODE   5411.00 =    1175.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5411.00 TO NODE   5411.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.33
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.101
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.40      0.98     0.100    32
 PUBLIC PARK                A        0.25      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.388
 SUBAREA AREA(ACRES) =    0.65      SUBAREA RUNOFF(CFS) =    1.59
 EFFECTIVE AREA(ACRES) =      7.63   AREA-AVERAGED Fm(INCH/HR) =  0.56
 AREA-AVERAGED Fp(INCH/HR) =  0.87  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      17.73
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5411.00 TO NODE   5411.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.33
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.101
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.41      0.98     0.100    32
 PUBLIC PARK                A        0.27      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.398
 SUBAREA AREA(ACRES) =    0.68      SUBAREA RUNOFF(CFS) =    1.66
 EFFECTIVE AREA(ACRES) =      8.31   AREA-AVERAGED Fm(INCH/HR) =  0.54
 AREA-AVERAGED Fp(INCH/HR) =  0.87  AREA-AVERAGED Ap =  0.62
 TOTAL AREA(ACRES) =        9.0       PEAK FLOW RATE(CFS) =      19.11

****************************************************************************
 FLOW PROCESS FROM NODE   5411.00 TO NODE   5411.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.33
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.101
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
```



```
 "5-7 DWELLINGS/ACRE"       A        1.71      0.98     0.500    32
 SCHOOL                     A        5.80      0.98     0.600    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.577
 SUBAREA AREA(ACRES) =    7.51      SUBAREA RUNOFF(CFS) =   17.15
 EFFECTIVE AREA(ACRES) =     15.82   AREA-AVERAGED Fm(INCH/HR) =  0.55
 AREA-AVERAGED Fp(INCH/HR) =  0.92  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =       16.5       PEAK FLOW RATE(CFS) =      36.27

****************************************************************************
 FLOW PROCESS FROM NODE   5411.00 TO NODE   5415.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   690.07  DOWNSTREAM(FEET) =   689.61
 FLOW LENGTH(FEET) =    92.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.05
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      36.27
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   12.55
 LONGEST FLOWPATH FROM NODE   5048.00 TO NODE   5415.00 =    1267.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5415.00 TO NODE   5415.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.55
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.068
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.21      0.98     0.100    32
 PUBLIC PARK                A        0.14      0.98     0.850    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
 SUBAREA AREA(ACRES) =    0.35      SUBAREA RUNOFF(CFS) =    0.84
 EFFECTIVE AREA(ACRES) =     16.17   AREA-AVERAGED Fm(INCH/HR) =  0.55
 AREA-AVERAGED Fp(INCH/HR) =  0.92  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =       16.9       PEAK FLOW RATE(CFS) =      36.65

****************************************************************************
 FLOW PROCESS FROM NODE   5415.00 TO NODE   5415.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.55
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.068
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.21      0.98     0.100    32
 PUBLIC PARK                A        0.18      0.98     0.850    32
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.446
 SUBAREA AREA(ACRES) =    0.39      SUBAREA RUNOFF(CFS) =    0.92
 EFFECTIVE AREA(ACRES) =     16.56   AREA-AVERAGED Fm(INCH/HR) =  0.55
 AREA-AVERAGED Fp(INCH/HR) =  0.92  AREA-AVERAGED Ap =  0.59
 TOTAL AREA(ACRES) =       17.2       PEAK FLOW RATE(CFS) =      37.57

****************************************************************************
 FLOW PROCESS FROM NODE   5415.00 TO NODE   5420.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   689.61  DOWNSTREAM(FEET) =   687.37
 FLOW LENGTH(FEET) =   595.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.26
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      37.57
 PIPE TRAVEL TIME(MIN.) =   1.58    Tc(MIN.) =   14.13
 LONGEST FLOWPATH FROM NODE   5048.00 TO NODE   5420.00 =    1862.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5420.00 TO NODE   5420.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.13
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.857
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C       10.00      0.57     0.500    69
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        4.69      0.98     0.500    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.70
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =   14.69      SUBAREA RUNOFF(CFS) =   33.17
 EFFECTIVE AREA(ACRES) =     31.25   AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.82  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =       31.9       PEAK FLOW RATE(CFS) =      67.59

****************************************************************************
 FLOW PROCESS FROM NODE   5420.00 TO NODE   5420.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.13
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.857
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.30      0.98     0.100    32
 PUBLIC PARK                A        0.26      0.98     0.850    32
```



```
 COMMERCIAL                 C        0.15      0.57     0.100    69
 PUBLIC PARK                C        0.12      0.57     0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.84
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.443
 SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    1.85
 EFFECTIVE AREA(ACRES) =     32.08   AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.83  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =       32.8       PEAK FLOW RATE(CFS) =      69.45

****************************************************************************
 FLOW PROCESS FROM NODE   5420.00 TO NODE   5420.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.13
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.857
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.32      0.98     0.100    32
 PUBLIC PARK                A        0.28      0.98     0.850    32
 COMMERCIAL                 C        0.17      0.57     0.100    69
 PUBLIC PARK                C        0.12      0.57     0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.437
 SUBAREA AREA(ACRES) =    0.89      SUBAREA RUNOFF(CFS) =    1.99
 EFFECTIVE AREA(ACRES) =     32.97   AREA-AVERAGED Fm(INCH/HR) =  0.45
 AREA-AVERAGED Fp(INCH/HR) =  0.83  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =       33.7       PEAK FLOW RATE(CFS) =      71.44

****************************************************************************
 FLOW PROCESS FROM NODE   5420.00 TO NODE   5425.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   687.37  DOWNSTREAM(FEET) =   679.09
 FLOW LENGTH(FEET) =   640.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  29.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.61
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      71.44
 PIPE TRAVEL TIME(MIN.) =   0.92    Tc(MIN.) =   15.05
 LONGEST FLOWPATH FROM NODE   5048.00 TO NODE   5425.00 =    2502.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5425.00 TO NODE   5425.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.05
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                 C        0.53      0.57     0.100    69
  PUBLIC PARK                C        0.44      0.57     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.440
  SUBAREA AREA(ACRES) =    0.97      SUBAREA RUNOFF(CFS) =    2.18
  EFFECTIVE AREA(ACRES) =     33.94   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.82  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =       34.6       PEAK FLOW RATE(CFS) =      71.44
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5425.00 TO NODE   5425.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.53      0.57     0.100    69
  PUBLIC PARK                C        0.44      0.57     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.440
  SUBAREA AREA(ACRES) =    0.97      SUBAREA RUNOFF(CFS) =    2.18
  EFFECTIVE AREA(ACRES) =     34.91   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.81  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =       35.6       PEAK FLOW RATE(CFS) =      72.66

****************************************************************************
  FLOW PROCESS FROM NODE   5425.00 TO NODE   5425.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       72.66   15.05    2.751  0.81( 0.44) 0.54      34.9    5048.00
      2       68.39   16.77    2.579  0.82( 0.44) 0.54      35.6    5400.00
  LONGEST FLOWPATH FROM NODE   5048.00 TO NODE   5425.00 =    2502.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  PEAK FLOW RATE(CFS) =     1064.45    Tc(MIN.) =   38.00
  AREA-AVERAGED Fm(INCH/HR) =  0.21    Ybar = 0.24
  TOTAL AREA(ACRES) =      798.7
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5425.00 =   15159.00 FEET.

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.63; LAG(HR) = 0.51; Fm(INCH/HR) = 0.22; Ybar = 0.25
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
```



```
  DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
  3HR = 0.99; 6HR = 1.00; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =      834.3
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5425.00 =   15159.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0309; Lca/L=0.4,n=.0277; Lca/L=0.5,n=.0255;Lca/L=0.6,n=.0238
  TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =     320.07
  PEAK FLOW RATE(CFS) =    1102.99
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      834.3  TC(MIN.) =     38.00
  AREA-AVERAGED Fm(INCH/HR)=  0.22   Ybar =  0.25
  PEAK FLOW RATE(CFS)   =   1102.99
============================================================================
============================================================================
  END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS
```

Q3 Consulting

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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            Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

Mill Creek - Proposed Condition

```
 ************************* DESCRIPTION OF STUDY *************************
* SUBAREA 29                                                            *
* MILL CREEK SD                                                         *
* PROPOSED CONDITION 100YR                                              *
 ************************************************************************

  FILE NAME: PRMCRK.DAT
  TIME/DATE OF STUDY: 11:02 04/22/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

  *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   18.0     12.0    0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
```



```
  UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:
    WATERSHED LAG = 0.80 * Tc
    USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF
    2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH
    FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
    SIERRA MADRE DEPTH-AREA FACTORS USED.
                      AREA-AVERAGED
         DURATION    RAINFALL(INCH)
          5-MINUTES         0.44
         30-MINUTES         0.91
          1-HOUR            1.20
          3-HOUR            2.10
          6-HOUR            3.00
         24-HOUR            6.00
 *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD*


**************************************************************************
  FLOW PROCESS FROM NODE   5425.00 TO NODE   5425.00 IS CODE = 15.1
--------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<
==========================================================================
  PEAK FLOWRATE TABLE FILE NAME: MPMCRK.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1102.99    Tc(MIN.) =   38.00
  AREA-AVERAGED Fm(INCH/HR) =  0.22    Ybar = 0.25
  TOTAL AREA(ACRES) =      834.3
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5425.00 =   15159.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   5425.00 TO NODE   5425.00 IS CODE = 14.0
--------------------------------------------------------------------------
  >>>>>MEMORY BANK #  1 COPIED ONTO MAIN-STREAM MEMORY<<<<<
==========================================================================

  MAIN-STREAM MEMORY DEFINED AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1102.99    Tc(MIN.) =   38.00
  AREA-AVERAGED Fm(INCH/HR) =  0.22    Ybar = 0.25
  TOTAL AREA(ACRES) =      834.3
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5425.00 =   15159.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   5425.00 TO NODE   5455.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   676.55  DOWNSTREAM(FEET) =   671.57
  FLOW LENGTH(FEET) =   712.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 114.0 INCH PIPE IS  89.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.39
  ESTIMATED PIPE DIAMETER(INCH) = 114.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1102.99
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =   38.65
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5455.00 =   15871.00 FEET.
```

MP Node 5425 per 2012 MP

```
****************************************************************************
  FLOW PROCESS FROM NODE    5455.00 TO NODE    5455.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    38.65
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.562
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.66      0.57     0.100    69
  PUBLIC PARK                 C        0.46      0.57     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.408
  SUBAREA AREA(ACRES) =     1.12
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.64; LAG(HR) = 0.52; Fm(INCH/HR) = 0.22; Ybar = 0.25
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
  3HR = 0.99; 6HR = 1.00; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00    TOTAL AREA(ACRES) =      835.4
  LONGEST FLOWPATH FROM NODE    5000.00 TO NODE    5455.00 =   15871.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0304; Lca/L=0.4,n=.0273; Lca/L=0.5,n=.0251;Lca/L=0.6,n=.0234
  TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =     320.50
  UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) =    1097.28
  TOTAL AREA(ACRES) =      835.4       PEAK FLOW RATE(CFS) =    1102.99
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    5455.00 TO NODE    5455.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  PEAK FLOW RATE(CFS) =    1102.99    Tc(MIN.) =   38.65
  AREA-AVERAGED Fm(INCH/HR) =  0.22   Ybar = 0.25
  TOTAL AREA(ACRES) =      835.4

****************************************************************************
  FLOW PROCESS FROM NODE    5430.00 TO NODE    5431.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   727.00
  ELEVATION DATA: UPSTREAM(FEET) =    703.40  DOWNSTREAM(FEET) =    687.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.657
```

P Area per 2012 MP


```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.207
  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.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        1.00      0.57     0.500    69   11.66
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        A        2.95      0.98     0.500    32   11.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.87
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      9.85
  TOTAL AREA(ACRES) =      3.95   PEAK FLOW RATE(CFS) =      9.85

****************************************************************************
  FLOW PROCESS FROM NODE    5431.00 TO NODE    5432.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   687.50  DOWNSTREAM(FEET) =   682.10
  FLOW LENGTH(FEET) =   749.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.86
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.85
  PIPE TRAVEL TIME(MIN.) =   2.13    Tc(MIN.) =   13.79
  LONGEST FLOWPATH FROM NODE    5430.00 TO NODE    5432.00 =    1476.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    5432.00 TO NODE    5432.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.900
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        3.81      0.57     0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     3.81      SUBAREA RUNOFF(CFS) =     8.97
  EFFECTIVE AREA(ACRES) =      7.76   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.72  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      17.73

****************************************************************************
  FLOW PROCESS FROM NODE    5432.00 TO NODE    5435.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   682.10  DOWNSTREAM(FEET) =   681.00
  FLOW LENGTH(FEET) =   166.00   MANNING'S N =  0.013
```

P Area per 2012 MP

P Area per 2012 MP

```
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.58
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.73
 PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   14.21
 LONGEST FLOWPATH FROM NODE   5430.00 TO NODE   5435.00 =    1642.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5435.00 TO NODE   5435.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.21
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.848      P Area per 2012 MP
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        1.85      0.57     0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    1.85      SUBAREA RUNOFF(CFS) =    4.27
 EFFECTIVE AREA(ACRES) =      9.61   AREA-AVERAGED Fm(INCH/HR) =  0.35
 AREA-AVERAGED Fp(INCH/HR) =  0.69  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =      21.64

****************************************************************************
 FLOW PROCESS FROM NODE   5435.00 TO NODE   5455.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   681.00  DOWNSTREAM(FEET) =   675.09
 FLOW LENGTH(FEET) =   357.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.73
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.64
 PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   14.82
 LONGEST FLOWPATH FROM NODE   5430.00 TO NODE   5455.00 =    1999.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5455.00 TO NODE   5455.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.82
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.777      P Area per 2012 MP
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.53      0.57     0.500    69
 PUBLIC PARK                C        0.90      0.57     0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
```



```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.592
 SUBAREA AREA(ACRES) =    3.43      SUBAREA RUNOFF(CFS) =    7.54
 EFFECTIVE AREA(ACRES) =     13.04   AREA-AVERAGED Fm(INCH/HR) =  0.34
 AREA-AVERAGED Fp(INCH/HR) =  0.65  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =       13.0       PEAK FLOW RATE(CFS) =      28.56

****************************************************************************
 FLOW PROCESS FROM NODE   5455.00 TO NODE   5455.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.82
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.777      P Area per 2012 MP
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.96      0.57     0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =    0.96      SUBAREA RUNOFF(CFS) =    2.15
 EFFECTIVE AREA(ACRES) =     14.00   AREA-AVERAGED Fm(INCH/HR) =  0.34
 AREA-AVERAGED Fp(INCH/HR) =  0.65  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =       14.0       PEAK FLOW RATE(CFS) =      30.72

****************************************************************************
 FLOW PROCESS FROM NODE   5455.00 TO NODE   5455.00 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.) =   14.82
 RAINFALL INTENSITY(INCH/HR) =   2.78
 AREA-AVERAGED Fm(INCH/HR) =  0.34
 AREA-AVERAGED Fp(INCH/HR) =  0.65
 AREA-AVERAGED Ap =  0.52
 EFFECTIVE STREAM AREA(ACRES) =      14.00
 TOTAL STREAM AREA(ACRES) =      14.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      30.72
 ** CONFLUENCE DATA **
 STREAM      Q        Tc      AREA      HEADWATER
 NUMBER    (CFS)    (MIN.)   (ACRES)      NODE
    1      1102.99   38.65      835.43     5000.00
    2        30.72   14.82       14.00     5430.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 UNIT-HYDROGRAPH DATA:
 RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
          MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
 Tc(HR) = 0.64; LAG(HR) = 0.52; Fm(INCH/HR) = 0.22; Ybar = 0.25
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
```

```
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00
 UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =      849.4
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5455.00 =   15871.00 FEET.
  EQUIVALENT BASIN FACTOR APPROXIMATIONS:
  Lca/L=0.3,n=.0303; Lca/L=0.4,n=.0271; Lca/L=0.5,n=.0249;Lca/L=0.6,n=.0233
 TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =     325.19
 PEAK FLOW RATE(CFS) =    1113.63

****************************************************************************
 FLOW PROCESS FROM NODE   5455.00 TO NODE   5455.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   38.65
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.562
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 C       12.10      0.57     0.200    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =   12.10
 UNIT-HYDROGRAPH DATA:
 RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
          MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
 Tc(HR) = 0.64; LAG(HR) = 0.52; Fm(INCH/HR) = 0.22; Ybar = 0.25
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00
 UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =      861.5
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5455.00 =   15871.00 FEET.
  EQUIVALENT BASIN FACTOR APPROXIMATIONS:
  Lca/L=0.3,n=.0303; Lca/L=0.4,n=.0271; Lca/L=0.5,n=.0249;Lca/L=0.6,n=.0233
 TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =     330.42
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) =    1129.93
 TOTAL AREA(ACRES) =      861.5       PEAK FLOW RATE(CFS) =    1129.93

****************************************************************************
 FLOW PROCESS FROM NODE   5455.00 TO NODE   5470.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   671.57  DOWNSTREAM(FEET) =   666.50
 FLOW LENGTH(FEET) =   767.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN 120.0 INCH PIPE IS  87.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.34
 ESTIMATED PIPE DIAMETER(INCH) = 120.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    1129.93
 PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =   39.34
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5470.00 =   16638.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5470.00 TO NODE   5470.00 IS CODE =  81
```

P2


```
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   39.34
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.546
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        1.23      0.57     0.100    69
 PUBLIC PARK                C        1.01      0.57     0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.438
 SUBAREA AREA(ACRES) =    2.24
 UNIT-HYDROGRAPH DATA:
 RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
          MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
 Tc(HR) = 0.66; LAG(HR) = 0.52; Fm(INCH/HR) = 0.22; Ybar = 0.25
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00
 UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =      863.8
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5470.00 =   16638.00 FEET.
  EQUIVALENT BASIN FACTOR APPROXIMATIONS:
  Lca/L=0.3,n=.0298; Lca/L=0.4,n=.0267; Lca/L=0.5,n=.0246;Lca/L=0.6,n=.0229
 TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =     331.26
 UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) =    1124.30
 TOTAL AREA(ACRES) =      863.8       PEAK FLOW RATE(CFS) =    1129.93
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5470.00 TO NODE   5470.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   39.34
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.546
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        0.58      0.57     0.100    69
 PUBLIC PARK                C        0.52      0.57     0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.455
 SUBAREA AREA(ACRES) =    1.10
 UNIT-HYDROGRAPH DATA:
 RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
 S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
          MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
 Tc(HR) = 0.66; LAG(HR) = 0.52; Fm(INCH/HR) = 0.22; Ybar = 0.25
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
 DEPTH-AREA FACTORS: 5M = 0.96; 30M = 0.96; 1HR = 0.96;
 3HR = 0.99; 6HR = 1.00; 24HR= 1.00
 UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =      864.9
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5470.00 =   16638.00 FEET.
```

P Area per 2012 MP

P Area per 2012 MP

```
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0298; Lca/L=0.4,n=.0267; Lca/L=0.5,n=.0246;Lca/L=0.6,n=.0229
  TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =     331.67
  UNIT-HYDROGRAPH PEAK FLOW RATE(CFS) =    1125.65
  TOTAL AREA(ACRES) =      864.9       PEAK FLOW RATE(CFS) =    1129.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      864.9  TC(MIN.) =     39.34
  AREA-AVERAGED Fm(INCH/HR)=  0.22   Ybar =  0.25
  PEAK FLOW RATE(CFS)   =   1129.93
================================================================================
================================================================================
  END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS
```

Q3 Consulting

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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             Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

Milliken - Recreated 2012 MP Hydrology Tributary to MP Node 6130

```
 ************************* DESCRIPTION OF STUDY *************************
 * SUBAREA 29                                                           *
 * MILLIKEN WATERSHED                                                   *
 * 2017 ONTARIO MP - TRIB TO MP NODE 6130                               *
 ************************************************************************

  FILE NAME: MILLIKEN.DAT
  TIME/DATE OF STUDY: 12:14 03/15/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

  *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
  2   40.0     25.0    0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
```



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

  UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:
    WATERSHED LAG = 0.80 * Tc
    USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF
    2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH
    FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
    SIERRA MADRE DEPTH-AREA FACTORS USED.
                      AREA-AVERAGED
         DURATION    RAINFALL(INCH)
          5-MINUTES         0.44
         30-MINUTES         0.91
          1-HOUR            1.20
          3-HOUR            2.10
          6-HOUR            3.00
         24-HOUR            6.00
 *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD*


**************************************************************************
  FLOW PROCESS FROM NODE   6000.00 TO NODE   6005.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   800.00
  ELEVATION DATA: UPSTREAM(FEET) =    809.00  DOWNSTREAM(FEET) =    800.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.811
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.355
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        3.63      0.98     0.100    32   10.81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     10.64
  TOTAL AREA(ACRES) =      3.63   PEAK FLOW RATE(CFS) =     10.64

**************************************************************************
  FLOW PROCESS FROM NODE   6005.00 TO NODE   6010.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  800.00  DOWNSTREAM ELEVATION(FEET) =  795.06
  STREET LENGTH(FEET) =   920.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 40.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  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 =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.65
    HALFSTREET FLOOD WIDTH(FEET) =   24.42
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.85
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.84
  STREET FLOW TRAVEL TIME(MIN.) =   5.39   Tc(MIN.) =   16.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.633
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        5.89      0.98     0.100    32
  PUBLIC PARK                A        0.15      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.119
  SUBAREA AREA(ACRES) =    6.04      SUBAREA RUNOFF(CFS) =   13.68
  EFFECTIVE AREA(ACRES) =      9.67    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.11
  TOTAL AREA(ACRES) =        9.7        PEAK FLOW RATE(CFS) =      21.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.69   HALFSTREET FLOOD WIDTH(FEET) =  27.92
  FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY(FT*FT/SEC.) =   2.08
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6010.00 =    1720.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6010.00 TO NODE   6012.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   779.48  DOWNSTREAM(FEET) =   767.69
  FLOW LENGTH(FEET) =  1590.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.17
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.96
  PIPE TRAVEL TIME(MIN.) =   3.70    Tc(MIN.) =   19.90
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6012.50 =    3310.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6012.50 TO NODE   6012.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.90
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.327
  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        1.24      0.98     0.850    32
```



```
  COMMERCIAL                 A        2.91      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.324
  SUBAREA AREA(ACRES) =    4.15      SUBAREA RUNOFF(CFS) =    7.51
  EFFECTIVE AREA(ACRES) =     13.82   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =       13.8       PEAK FLOW RATE(CFS) =      26.82

****************************************************************************
  FLOW PROCESS FROM NODE   6012.50 TO NODE   6015.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   767.69  DOWNSTREAM(FEET) =   762.79
  FLOW LENGTH(FEET) =   917.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.59
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.82
  PIPE TRAVEL TIME(MIN.) =   2.32    Tc(MIN.) =   22.22
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6015.00 =    4227.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6015.00 TO NODE   6015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.22
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.178
  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        0.71      0.98     0.850    32
  COMMERCIAL                 A        1.70      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.321
  SUBAREA AREA(ACRES) =    2.41      SUBAREA RUNOFF(CFS) =    4.05
  EFFECTIVE AREA(ACRES) =     16.23   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       16.2       PEAK FLOW RATE(CFS) =      29.01

****************************************************************************
  FLOW PROCESS FROM NODE   6015.00 TO NODE   6020.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   762.79  DOWNSTREAM(FEET) =   745.81
  FLOW LENGTH(FEET) =  1290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.53
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.01
  PIPE TRAVEL TIME(MIN.) =   2.26    Tc(MIN.) =   24.47
```

```
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6020.00 =    5517.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6020.00 TO NODE   6020.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   24.47
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.055
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        3.35      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    3.35      SUBAREA RUNOFF(CFS) =    5.90
 EFFECTIVE AREA(ACRES) =     19.58   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =       19.6       PEAK FLOW RATE(CFS) =      33.12

****************************************************************************
 FLOW PROCESS FROM NODE   6020.00 TO NODE   6020.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   745.81  DOWNSTREAM(FEET) =   736.48
 FLOW LENGTH(FEET) =  1450.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.57
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      33.12
 PIPE TRAVEL TIME(MIN.) =   3.19    Tc(MIN.) =   27.67
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6020.00 =    6967.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6025.00 TO NODE   6025.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   27.67
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.909
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        3.83      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    3.83      SUBAREA RUNOFF(CFS) =    6.25
 EFFECTIVE AREA(ACRES) =     23.41   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.17
 TOTAL AREA(ACRES) =       23.4       PEAK FLOW RATE(CFS) =      36.79

****************************************************************************
 FLOW PROCESS FROM NODE   6025.00 TO NODE   6030.00 IS CODE =  31
```



```
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   736.48  DOWNSTREAM(FEET) =   724.27
 FLOW LENGTH(FEET) =  1164.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.21
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      36.79
 PIPE TRAVEL TIME(MIN.) =   2.11    Tc(MIN.) =   29.77
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6030.00 =    8131.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6030.00 TO NODE   6030.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   29.77
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.827
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        3.06      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    3.06      SUBAREA RUNOFF(CFS) =    4.76
 EFFECTIVE AREA(ACRES) =     26.47   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =       26.5       PEAK FLOW RATE(CFS) =      39.83

****************************************************************************
 FLOW PROCESS FROM NODE   6030.00 TO NODE   6050.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   724.27  DOWNSTREAM(FEET) =   713.28
 FLOW LENGTH(FEET) =   769.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.65
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      39.83
 PIPE TRAVEL TIME(MIN.) =   1.20    Tc(MIN.) =   30.97
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6050.00 =    8900.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6050.00 TO NODE   6050.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   30.97
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.784
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               A       12.09      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   12.09      SUBAREA RUNOFF(CFS) =   18.35
  EFFECTIVE AREA(ACRES) =     38.56   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =       38.6       PEAK FLOW RATE(CFS) =      57.16

****************************************************************************
  FLOW PROCESS FROM NODE   6050.00 TO NODE   6075.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.28  DOWNSTREAM(FEET) =   702.49
  FLOW LENGTH(FEET) =   692.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.96
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      57.16
  PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =   31.94
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6075.00 =    9592.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6075.00 TO NODE   6075.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.94
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.752
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               A        6.70      0.98     0.100    32
  COMMERCIAL               C        4.77      0.57     0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   11.47      SUBAREA RUNOFF(CFS) =   17.25
  EFFECTIVE AREA(ACRES) =     50.03   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.95  AREA-AVERAGED Ap =  0.13
  TOTAL AREA(ACRES) =       50.0       PEAK FLOW RATE(CFS) =      73.28

****************************************************************************
  FLOW PROCESS FROM NODE   6075.00 TO NODE   6077.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   702.49  DOWNSTREAM(FEET) =   698.66
  FLOW LENGTH(FEET) =   476.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.00
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      73.28
```



```
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   32.73
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6077.50 =   10068.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6077.50 TO NODE   6077.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.726
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               C        0.90      0.57     0.100    69
  PUBLIC PARK              C        0.16      0.57     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.213
  SUBAREA AREA(ACRES) =    1.06      SUBAREA RUNOFF(CFS) =    1.53
  EFFECTIVE AREA(ACRES) =     51.09   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.93  AREA-AVERAGED Ap =  0.13
  TOTAL AREA(ACRES) =       51.1       PEAK FLOW RATE(CFS) =      73.66

****************************************************************************
  FLOW PROCESS FROM NODE   6077.50 TO NODE   6105.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   698.66  DOWNSTREAM(FEET) =   690.85
  FLOW LENGTH(FEET) =   831.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.43
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      73.66
  PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   34.06
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6105.00 =   10899.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6105.00 TO NODE   6105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.06
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.685
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               C        1.53      0.57     0.100    69
  PUBLIC PARK              C        0.35      0.57     0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.240
  SUBAREA AREA(ACRES) =    1.88      SUBAREA RUNOFF(CFS) =    2.62
  EFFECTIVE AREA(ACRES) =     52.97   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.91  AREA-AVERAGED Ap =  0.14
  TOTAL AREA(ACRES) =       53.0       PEAK FLOW RATE(CFS) =      74.41
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   6105.00 TO NODE   6105.00 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.) =   34.06
  RAINFALL INTENSITY(INCH/HR) =   1.69
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.91
  AREA-AVERAGED Ap =  0.14
  EFFECTIVE STREAM AREA(ACRES) =      52.97
  TOTAL STREAM AREA(ACRES) =      52.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      74.41

****************************************************************************
  FLOW PROCESS FROM NODE   6080.00 TO NODE   6085.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
  ELEVATION DATA: UPSTREAM(FEET) =    715.50  DOWNSTREAM(FEET) =    714.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.005
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.744
  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.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        1.38      0.57     0.200    69    9.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      4.51
  TOTAL AREA(ACRES) =      1.38   PEAK FLOW RATE(CFS) =      4.51

****************************************************************************
  FLOW PROCESS FROM NODE   6085.00 TO NODE   6090.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  714.50  DOWNSTREAM ELEVATION(FEET) =  713.50
  STREET LENGTH(FEET) =   847.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
```



```
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.50
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.58
   HALFSTREET FLOOD WIDTH(FEET) =   23.55
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.21
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.71
  STREET FLOW TRAVEL TIME(MIN.) =  11.62   Tc(MIN.) =   20.63
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.277
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        7.98      0.57     0.200    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    7.98      SUBAREA RUNOFF(CFS) =   15.54
  EFFECTIVE AREA(ACRES) =      9.36    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        9.4        PEAK FLOW RATE(CFS) =      18.23

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.65   HALFSTREET FLOOD WIDTH(FEET) =  27.30
  FLOW VELOCITY(FEET/SEC.) =  1.33   DEPTH*VELOCITY(FT*FT/SEC.) =   0.86
  LONGEST FLOWPATH FROM NODE   6080.00 TO NODE   6090.00 =    1102.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6090.00 TO NODE   6095.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   713.50  DOWNSTREAM(FEET) =   706.60
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.32
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.23
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =   21.39
  LONGEST FLOWPATH FROM NODE   6080.00 TO NODE   6095.00 =    1527.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6095.00 TO NODE   6095.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.228
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
"11+ DWELLINGS/ACRE"       A        1.00      0.98     0.200    32
RESIDENTIAL
"11+ DWELLINGS/ACRE"       C        8.67      0.57     0.200    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA AREA(ACRES) =    9.67      SUBAREA RUNOFF(CFS) =   18.33
EFFECTIVE AREA(ACRES) =     19.03   AREA-AVERAGED Fm(INCH/HR) =  0.12
AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.20
TOTAL AREA(ACRES) =       19.0       PEAK FLOW RATE(CFS) =      36.15

****************************************************************************
FLOW PROCESS FROM NODE   6095.00 TO NODE   6097.50 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   706.60  DOWNSTREAM(FEET) =   703.67
FLOW LENGTH(FEET) =   586.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.04
ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      36.15
PIPE TRAVEL TIME(MIN.) =   1.39    Tc(MIN.) =   22.78
LONGEST FLOWPATH FROM NODE   6080.00 TO NODE   6097.50 =    2113.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   6097.50 TO NODE   6097.50 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   22.78
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.146
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"       A        2.30      0.98     0.500    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"       C        9.59      0.57     0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.65
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
SUBAREA AREA(ACRES) =   11.89      SUBAREA RUNOFF(CFS) =   19.51
EFFECTIVE AREA(ACRES) =     30.92   AREA-AVERAGED Fm(INCH/HR) =  0.20
AREA-AVERAGED Fp(INCH/HR) =  0.62  AREA-AVERAGED Ap =  0.32
TOTAL AREA(ACRES) =       30.9       PEAK FLOW RATE(CFS) =      54.25

****************************************************************************
FLOW PROCESS FROM NODE   6097.50 TO NODE   6100.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   703.67  DOWNSTREAM(FEET) =   700.00
FLOW LENGTH(FEET) =   742.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.4 INCHES
```



```
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.57
ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      54.25
PIPE TRAVEL TIME(MIN.) =   1.63    Tc(MIN.) =   24.41
LONGEST FLOWPATH FROM NODE   6080.00 TO NODE   6100.00 =    2855.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   6100.00 TO NODE   6100.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   24.41
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.058
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"       C        9.54      0.57     0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
SUBAREA AREA(ACRES) =    9.54      SUBAREA RUNOFF(CFS) =   15.24
EFFECTIVE AREA(ACRES) =     40.46   AREA-AVERAGED Fm(INCH/HR) =  0.22
AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.36
TOTAL AREA(ACRES) =       40.5       PEAK FLOW RATE(CFS) =      67.06

****************************************************************************
FLOW PROCESS FROM NODE   6100.00 TO NODE   6105.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   690.85
FLOW LENGTH(FEET) =   477.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  13.33
ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      67.06
PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =   25.01
LONGEST FLOWPATH FROM NODE   6080.00 TO NODE   6105.00 =    3332.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   6105.00 TO NODE   6105.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   25.01
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.029
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                 C        1.55      0.57     0.100    69
PUBLIC PARK                C        0.75      0.57     0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.345
SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    3.80
```

```
 EFFECTIVE AREA(ACRES) =     42.76   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.36
 TOTAL AREA(ACRES) =       42.8       PEAK FLOW RATE(CFS) =      69.78

****************************************************************************
 FLOW PROCESS FROM NODE   6105.00 TO NODE   6105.00 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.) =   25.01
 RAINFALL INTENSITY(INCH/HR) =   2.03
 AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.60
 AREA-AVERAGED Ap =  0.36
 EFFECTIVE STREAM AREA(ACRES) =      42.76
 TOTAL STREAM AREA(ACRES) =      42.76
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      69.78

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       74.41   34.06    1.685  0.91( 0.12) 0.14      53.0    6000.00
     2       69.78   25.01    2.029  0.60( 0.22) 0.36      42.8    6080.00

 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      136.43   25.01    2.029  0.68( 0.17) 0.25      81.6    6080.00
     2      130.98   34.06    1.685  0.70( 0.17) 0.24      95.7    6000.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     136.43    Tc(MIN.) =    25.01
 EFFECTIVE AREA(ACRES) =      81.65   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.68  AREA-AVERAGED Ap =  0.25
 TOTAL AREA(ACRES) =       95.7
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6105.00 =   10899.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6105.00 TO NODE   6130.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   690.85  DOWNSTREAM(FEET) =   679.50
 FLOW LENGTH(FEET) =  1791.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.59
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     136.43
```



```
 PIPE TRAVEL TIME(MIN.) =   2.82    Tc(MIN.) =   27.82
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6130.00 =   12690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6130.00 TO NODE   6130.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   27.82
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.903
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 C        3.02      0.57     0.100    69
 PUBLIC PARK                C        0.98      0.57     0.850    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.284
 SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    6.27
 EFFECTIVE AREA(ACRES) =     85.65   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.68  AREA-AVERAGED Ap =  0.25
 TOTAL AREA(ACRES) =       99.7       PEAK FLOW RATE(CFS) =     136.43
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   6130.00 TO NODE   6130.00 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.) =   27.82
 RAINFALL INTENSITY(INCH/HR) =   1.90
 AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.68
 AREA-AVERAGED Ap =  0.25
 EFFECTIVE STREAM AREA(ACRES) =      85.65
 TOTAL STREAM AREA(ACRES) =      99.73
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     136.43

****************************************************************************
 FLOW PROCESS FROM NODE   6110.00 TO NODE   6115.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   595.00
 ELEVATION DATA: UPSTREAM(FEET) =    704.20  DOWNSTREAM(FEET) =    703.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   21.589
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.216
 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.)
 RESIDENTIAL
```

```
"5-7 DWELLINGS/ACRE"       C        3.15      0.57     0.500    69   21.59
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
SUBAREA RUNOFF(CFS) =      5.48
TOTAL AREA(ACRES) =      3.15   PEAK FLOW RATE(CFS) =      5.48

****************************************************************************
FLOW PROCESS FROM NODE   6115.00 TO NODE   6120.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  703.80  DOWNSTREAM ELEVATION(FEET) =  702.90
STREET LENGTH(FEET) =   386.00   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 30.00

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

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.11
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.53
  HALFSTREET FLOOD WIDTH(FEET) =   20.35
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.56
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.82
STREET FLOW TRAVEL TIME(MIN.) =   4.13   Tc(MIN.) =   25.72
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.995
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"       C        7.71      0.57     0.500    69
PUBLIC PARK                C        1.00      0.57     0.850    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.540
SUBAREA AREA(ACRES) =    8.71      SUBAREA RUNOFF(CFS) =   13.24
EFFECTIVE AREA(ACRES) =     11.86    AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  0.53
TOTAL AREA(ACRES) =       11.9        PEAK FLOW RATE(CFS) =      18.09

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.59   HALFSTREET FLOOD WIDTH(FEET) =  23.87
FLOW VELOCITY(FEET/SEC.) =  1.71   DEPTH*VELOCITY(FT*FT/SEC.) =   1.01
LONGEST FLOWPATH FROM NODE   6110.00 TO NODE   6120.00 =     981.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   6120.00 TO NODE   6125.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```



```
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   702.90  DOWNSTREAM(FEET) =   689.90
FLOW LENGTH(FEET) =   676.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 24.000
DEPTH OF FLOW IN  24.0 INCH PIPE IS  13.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   9.93
ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      18.09
PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =   26.86
LONGEST FLOWPATH FROM NODE   6110.00 TO NODE   6125.00 =    1657.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   6125.00 TO NODE   6125.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   26.86
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.944
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"       A        2.10      0.98     0.500    32
RESIDENTIAL
"5-7 DWELLINGS/ACRE"       C        4.13      0.57     0.500    69
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.70
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
SUBAREA AREA(ACRES) =    6.23      SUBAREA RUNOFF(CFS) =    8.92
EFFECTIVE AREA(ACRES) =     18.09   AREA-AVERAGED Fm(INCH/HR) =  0.32
AREA-AVERAGED Fp(INCH/HR) =  0.61  AREA-AVERAGED Ap =  0.52
TOTAL AREA(ACRES) =       18.1       PEAK FLOW RATE(CFS) =      26.47

****************************************************************************
FLOW PROCESS FROM NODE   6125.00 TO NODE   6130.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   689.90  DOWNSTREAM(FEET) =   679.50
FLOW LENGTH(FEET) =  1196.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.85
ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      26.47
PIPE TRAVEL TIME(MIN.) =   2.54    Tc(MIN.) =   29.40
LONGEST FLOWPATH FROM NODE   6110.00 TO NODE   6130.00 =    2853.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   6130.00 TO NODE   6130.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   29.40
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.841
```

```
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C        8.18      0.57     0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =     8.18      SUBAREA RUNOFF(CFS) =   11.47
 EFFECTIVE AREA(ACRES) =     26.27   AREA-AVERAGED Fm(INCH/HR) =  0.31
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.51
 TOTAL AREA(ACRES) =       26.3       PEAK FLOW RATE(CFS) =      36.27

****************************************************************************
 FLOW PROCESS FROM NODE   6130.00 TO NODE   6130.00 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.) =   29.40
 RAINFALL INTENSITY(INCH/HR) =   1.84
 AREA-AVERAGED Fm(INCH/HR) =  0.31
 AREA-AVERAGED Fp(INCH/HR) =  0.60
 AREA-AVERAGED Ap =  0.51
 EFFECTIVE STREAM AREA(ACRES) =      26.27
 TOTAL STREAM AREA(ACRES) =      26.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      36.27

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      136.43   27.82    1.903  0.68( 0.17) 0.25      85.6    6080.00
     1      130.98   36.89    1.607  0.69( 0.17) 0.24      99.7    6000.00
     2       36.27   29.40    1.841  0.60( 0.31) 0.51      26.3    6110.00

 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      172.14   27.82    1.903  0.65( 0.20) 0.31     110.5    6080.00
     2      171.76   29.40    1.841  0.65( 0.20) 0.31     114.4    6110.00
     3      161.71   36.89    1.607  0.66( 0.19) 0.30     126.0    6000.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     172.14    Tc(MIN.) =    27.82
 EFFECTIVE AREA(ACRES) =     110.51   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.65  AREA-AVERAGED Ap =  0.31
 TOTAL AREA(ACRES) =      126.0
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6130.00 =   12690.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      126.0  TC(MIN.) =     27.82
```



```
 EFFECTIVE AREA(ACRES) =    110.51  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.65  AREA-AVERAGED Ap = 0.313
 PEAK FLOW RATE(CFS)   =     172.14

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      172.14   27.82    1.903  0.65( 0.20) 0.31     110.5    6080.00
     2      171.76   29.40    1.841  0.65( 0.20) 0.31     114.4    6110.00
     3      161.71   36.89    1.607  0.66( 0.19) 0.30     126.0    6000.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Appendix B – Hydraulics

- **County Line Channel WSPG Results**
- **County Line Channel HGL Comparison**
- **Haven Ave SD WSPG Results**
- **Haven Ave SD HGL Comparison**
- **Mill Creek WSPG Results**
- **Mill Creek HGL Comparison**

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SUBAREA 29

HEADING LINE NO 2 IS -

COUNTY LINE WITH UPDATED Q100 AND 2017 MP TW

HEADING LINE NO 3 IS -

2022-04-25

DATE: 3/24/2022
TIME: 16: 2

F0515P

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	2	0	0.00	14.00	22.00			0.00										
CD	2	3	0	0.00	14.00	22.00	0.00	0.00	0.00										
CD	3	2	0	0.00	16.50	22.00			0.00										
CD	5	4			8.00														
CD	6	3	0	0.00	10.00	18.00	0.00	0.00	0.00										
CD	8	2	0	0.00	10.00	18.00			0.00										
CD	9	4			7.50														
CD	10	2	0	0.00	10.00	16.00			0.00										
CD	11	3	0	0.00	10.00	10.00	0.00	0.00	0.00										
CD	12	3	0	0.00	10.00	16.00	0.00	0.00	0.00										
CD	14	4			9.00														
CD	15	4			5.00														
CD	16	3	0	0.00	5.00	10.00	0.00	0.00	0.00										
CD	17	4			5.00														
CD	18	4			3.00														
CD	19	4			5.50														
CD	20	4			2.00														

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	8118.22	659.16	12	669.16

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	8118.22	659.16	12	0.014	0.00	0.00	0.00	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	8619.32	660.53	12	0.014	0.00	0.00	0.00	0

ELEMENT NO 4 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	8619.33	660.54	12	5	0	0.014	499.4	0.0	661.50	0.00	30.00	0.00

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	10110.31	664.62	12	0.014	0.00	0.00	0.00	0

ELEMENT NO 6 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	10116.31	664.64	12	17	0	0.014	33.4	0.0	665.00	0.00	30.00	0.00

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	11452.00	668.30	12	0.014	0.00	0.00	0.00	0

ELEMENT NO 8 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	11485.00	668.39	11	14	0	0.014	1118.8	0.0	669.00	0.00	30.00	0.00

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	14277.00	676.04	11	0.014	0.00	0.00	0.00	0

ELEMENT NO 10 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	14277.00	676.04	11	676.04

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

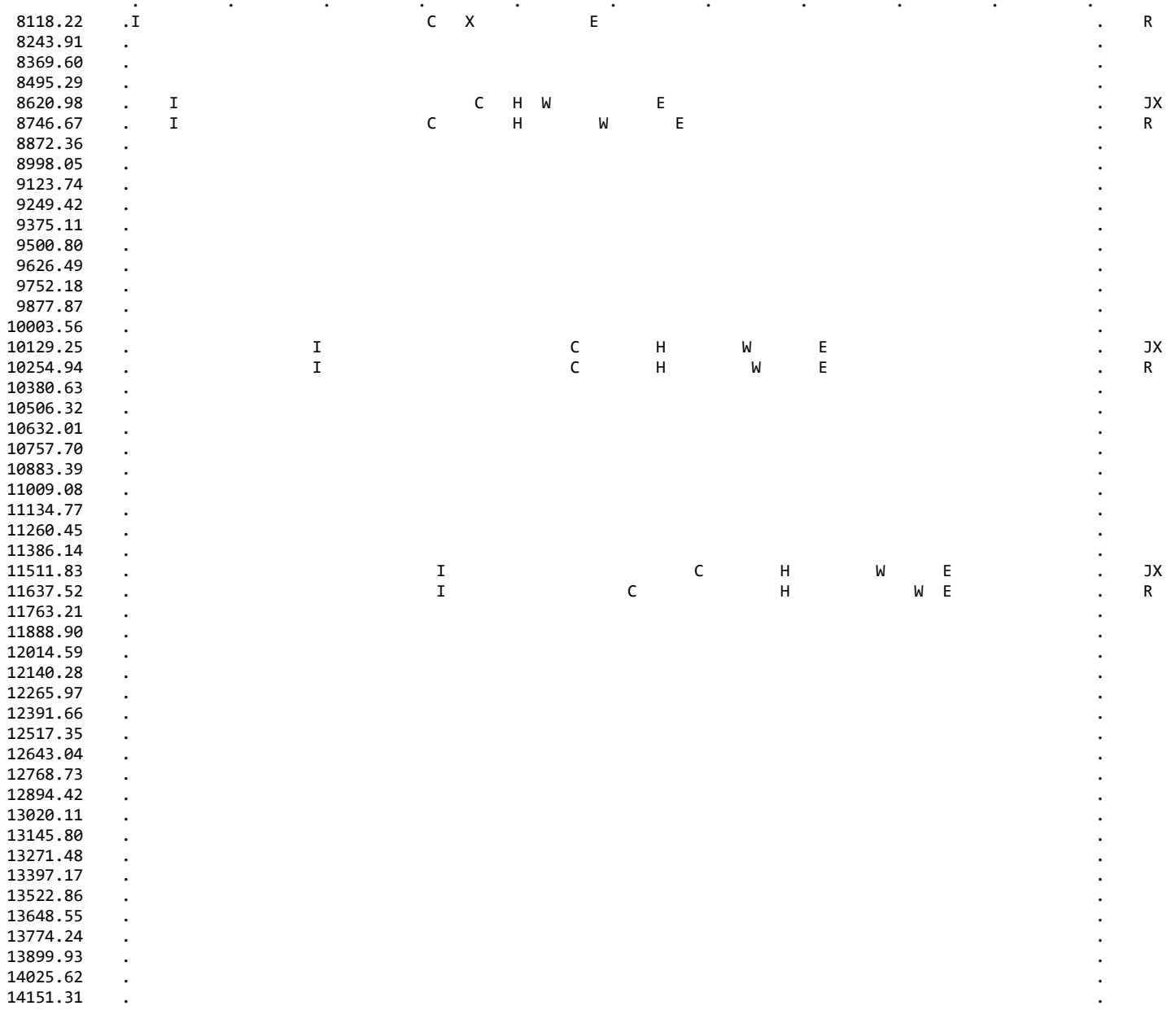
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC

WATER SURFACE PROFILE LISTING

SUBAREA 29
COUNTY LINE WITH UPDATED Q100 AND 2017 MP TW
2022-04-25

STATION / L/ELEM	INVERT ELEV / SO	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD / SF AVE	ENERGY GRD.EL. / HF	SUPER ELEV	CRITICAL DEPTH / NORM DEPTH	HGT/ DIA	BASE/ ID NO.	ZL / ZR	NO PIER	AVBPR
8118.22	659.16	10.000	669.160	2388.5	14.95	3.471	672.631	0.00	8.848	10.00	16.00	0.00	0	0.00
501.10	0.00273					.004443	2.23		9.962			0.00		
8619.32	660.53	10.856	671.386	2388.5	14.95	3.471	674.857	0.00	8.848	10.00	16.00	0.00	0	0.00
JUNCT STR	1.00000					.003611	0.00					0.00		
8619.33	660.54	12.611	673.151	1889.1	11.83	2.171	675.322	0.00	7.567	10.00	16.00	0.00	0	0.00
1490.98	0.00274					.002779	4.14		8.328			0.00		
10110.31	664.62	12.675	677.295	1889.1	11.83	2.171	679.466	0.00	7.567	10.00	16.00	0.00	0	0.00
JUNCT STR	0.00333					.002730	0.02					0.00		
10116.31	664.64	12.814	677.454	1855.7	11.62	2.095	679.549	0.00	7.478	10.00	16.00	0.00	0	0.00
1335.69	0.00274					.002682	3.58		8.212			0.00		
11452.00	668.30	12.736	681.036	1855.7	11.62	2.095	683.131	0.00	7.478	10.00	16.00	0.00	0	0.00
JUNCT STR	0.00273					.002057	0.07					0.00		
11485.00	668.39	13.961	682.351	736.9	7.39	0.847	683.198	0.00	5.526	10.00	10.00	0.00	0	0.00
2792.00	0.00274					.001432	4.00		6.605			0.00		
14277.00	676.04	10.311	686.351	736.9	7.39	0.847	687.198	0.00	5.526	10.00	10.00	0.00	0	0.00

SUBAREA 29
COUNTY LINE WITH UPDATED Q100 AND 2017 MP TW
2022-04-25

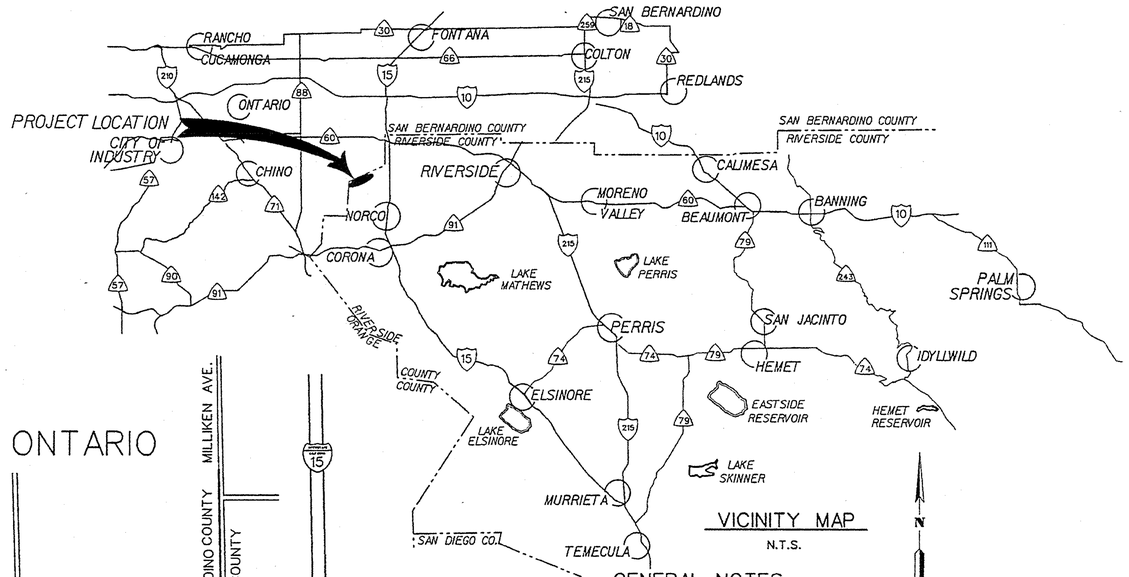


.	.	.	.	.	.	.	.	.	.	.
659.16	661.96	664.77	667.57	670.38	673.18	675.98	678.79	681.59	684.39	687.20

N O T E S

1. GLOSSARY
   - I = INVERT ELEVATION
   - C = CRITICAL DEPTH
   - W = WATER SURFACE ELEVATION
   - H = HEIGHT OF CHANNEL
   - E = ENERGY GRADE LINE
   - X = CURVES CROSSING OVER
   - B = BRIDGE ENTRANCE OR EXIT
   - Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT



VICINITY MAP
N.T.S.

INDEX MAP
NTS

GENERAL NOTES

1. ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION.
2. ALL CHANNEL/STORM DRAIN REFERENCES AND CROSS SECTIONS ARE TAKEN LOOKING DOWNSTREAM.
3. TOPOGRAPHY BY DIGITAL PHOTOGRAMMETRIC METHODS. AERIAL PHOTOGRAPHS TAKEN AT AN ALTITUDE NOT TO EXCEED A FLYING HEIGHT TO CONTOUR INTERVAL RATIO OF 1800. PHOTOGRAPHY DATED 12-19-00. THE EXISTING TOPOGRAPHY MAY BE DIFFERENT THAN AS SHOWN ON THE DRAWINGS.
4. THE VERTICAL DATUM IS DERIVED FROM NAVD 88. THE HORIZONTAL DATUM IS DERIVED FROM NAD 83.
5. STANDARD DRAWINGS CALLED FOR ON THE PLAN & PROFILE SHALL CONFORM TO R.C.F.C. & W.C.D. STD. DRAWINGS, UNLESS OTHERWISE NOTED.
6. ELEVATIONS AND LOCATIONS OF UTILITIES WERE OBTAINED FROM AVAILABLE INFORMATION AND ARE SHOWN APPROXIMATELY ON THESE PLANS. 48 HOURS BEFORE EXCAVATION CALL UNDERGROUND SERVICE ALERT AT 1-800-227-2600. ALL UTILITIES SHALL BE PROTECTED IN PLACE EXCEPT AS NOTED ON PLANS AND SPECIFICATIONS.
7. THE CONTRACTOR IS REQUIRED TO CONTACT ALL UTILITY AGENCIES REGARDING TEMPORARY SUPPORT AND SHORING REQUIREMENTS FOR THE VARIOUS UTILITY LINES SHOWN ON THESE PLANS.
8. ALL OPENINGS RESULTING FROM CUTTING OR PARTIAL REMOVAL OF EXIST. CULVERTS, PIPES, OR SIMILAR STRUCTURES TO BE ABANDONED, SHALL BE SEALED AT BOTH ENDS WITH 6" MIN. CLASS "B" CONCRETE.
9. STREET RECONSTRUCTION SHALL BE 0.25' TYPE 'B' ASPHALT CONCRETE OVER 6" AGGREGATE BASE OR IN KIND, WHICHEVER IS GREATER. EXISTING PAVEMENT ON THE SOUTH SIDE OF BELLEGRAVE AVENUE IS .43' ASPHALT CONCRETE OVER .75' AGGREGATE BASE. RECONSTRUCTION OF ARCHIBALD AVE. PAVEMENT SHALL BE .43' ASPHALT CONCRETE OVER 0.50' AGGREGACTE BASE.
10. ALL RECONSTRUCTION, RESURFACING AND PAVEMENT DELINEATION, CURBS, SIDEWALKS AND OTHER IMPROVEMENTS ARE TO BE RECONSTRUCTED IN KIND AT THE SAME LOCATIONS AND ELEVATIONS AS THE EXISTING IMPROVEMENTS, UNLESS OTHERWISE NOTED.
11. ◆ INDICATES APPROX. SOIL BORING LOCATION PER SOILS REPORT DATED 10/09/02.
12. FOR COMPLETE RIGHT-OF-WAY AND TEMPORARY EASEMENT REFER TO DRAWING No. 2-322, SHT. 1 TO 14 AND DRAWING NO. 2-322T SHT. 1 TO14 RESPECTIVELY.

REGISTERED PROFESSIONAL ENGINEER
CLYDE D. JOHNSON
No. 30539
Exp. 3-31-04
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
WARREN D. WILLIAMS
No. 32336
Exp. 12-31-04
CIVIL
STATE OF CALIFORNIA

INDEX

R.C.F.C. & W.C.D. STANDARD DRAWINGS

CALTRANS STANDARDS

SBCFC STANDARDS

File #1-317-1

COUNTY OF RIVERSIDE TRANSPORTATION DEPARTMENT APPROVED BY: DEPUTY DIRECTOR OF TRANSPORTATION DATE:	COUNTY OF SAN BERNARDINO PUBLIC WORKS DEPARTMENT APPROVED BY: PUBLIC WORKS DIRECTOR DATE:	CITY OF ONTARIO APPROVED BY: CITY ENGINEER DATE:	Don't Dig...Until You Call U.S.A. Toll Free 1-800-227-2600 for the location of buried utility lines. Don't disrupt vital services. TWO WORKING DAYS BEFORE YOU DIG

BENCH MARK
M.L. 33 RESET JULY 1964

A BRASS DISK SET IN THE TOP OF A CONCRETE GAS COMPANY VAULT AT THE SOUTHWEST CORNER OF THE "T" INTERSECTION OF ARCHIBALD AVE. AND CLOVERDALE ROAD.

NAVD "88" ELEV=647.564

REF.	REVISIONS	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RECOMMENDED FOR APPROVAL BY:
CHIEF, DESIGN & CONSTRUCTION
DATE: 12/30/03 R.E. No. 30539

APPROVED BY:
CHIEF ENGINEER
DATE: 12/30/03 R.E. NO. 32336

COUNTY LINE CHANNEL

TITLE SHEET

PROJECT NO. 2-0-0.
DRAWING NO. 2-31
SHEET NO. 1 OF

NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES UNLESS OTHERWISE NOTED.

79+00 80+00 81+00 82+00 83+00

680 670 660 650

MATCH LINE SHEET 20

STA. 79+00

STA. 81+00 ② ℄ MH NO. 3

682.0 ± ④

EX. GROUND

EX. GROUND OF INTERIM COLLECTOR CHANNEL

Asbuilt HGL

HGL

STA 81+18.22
HGL =669.16'
(per 2012 MP HGL)

Updated Q100 = 2388.5 cfs

MP Q100 = 2385.1 cfs

PROFILE GRADE ℄ IMP.

S= 0.00274

658.57

659.66

STA 81+18.22
659.16 inv
Asbuilt HGL=670.4'
2012 MP HGL=669.16'

MATCH LINE SHEET 22

STA. 83+00

400' ①
16'W X 10'H RCB

HYDRAULIC DATA
Q_{100} = 2420 cfs
V_{100} = 16 fps

TCE 40'± EASEMENT 15' 10' EASEMENT 40'±

RIVERSIDE COUNTY
SAN BERNARDINO COUNTY

℄ 16' X 10' RCB

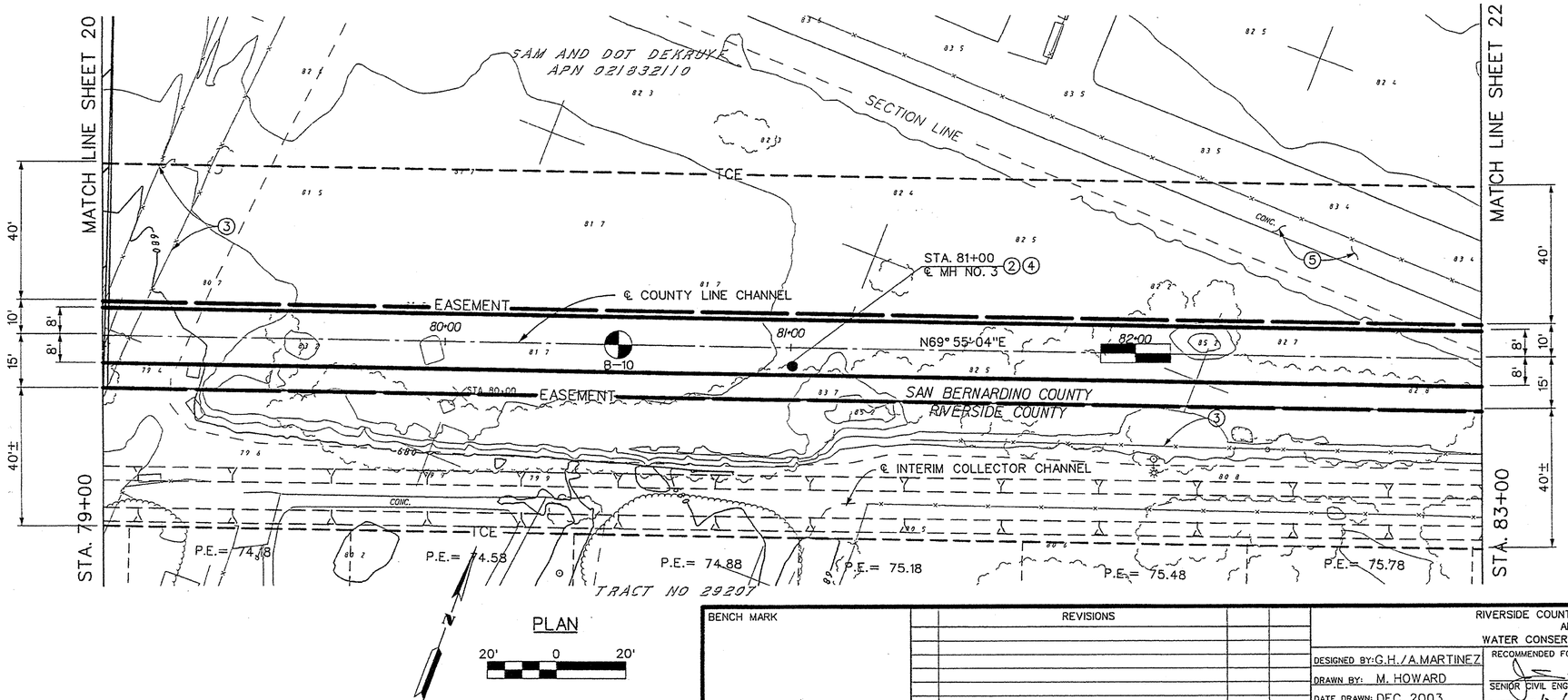
EX. GROUND

INTERIM COLLECTOR CHANNEL

PROFILE GRADE

SECTION AT STA. 82+00

10' 0 10'



PLAN

20' 0 20'

NOTES

① CONSTRUCT 16' X 10' RCB PER DETAILS ON SHEET 40.

② CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPLACE THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AND COVER PER SBCFC STD. 205.

③ REMOVE EXISTING FENCE AND COW FEEDER.

④ CONSTRUCT MANHOLE APRON PER SBCFC STD. D260.

⑤ REMOVE AND REPLACE COW FEEDER AND METAL FENCE AS REQUIRED.

REGISTERED PROFESSIONAL ENGINEER
JIM M. KONG
No. 27090
Exp. 3-31-05
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
CLYDE D. JOHNSON
No. 30539
Exp. 3-31-04
CIVIL
STATE OF CALIFORNIA

#1-317-1

BENCH MARK

REVISIONS			
REF.	DESCRIPTION	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RECOMMENDED FOR APPROVAL BY:
SENIOR CIVIL ENGINEER
DATE: 12/30/03 R.E. No. 27090

APPROVED BY:
CHIEF, DESIGN & CONSTRUCTION
DATE: 12/30/03 R.E. No. 30539

COUNTY LINE CHANNEL

STA. 79+00 TO STA. 83+00

PROJECT NO. 2-0-0
DRAWING NO. 2-31
SHEET NO. 21 OF

NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES UNLESS OTHERWISE NOTED.

83+00 84+00 85+00 86+00 87+00

MATCH LINE SHEET 21

MATCH LINE SHEET 23

STA. 83+00

STA. 87+50

683.5 +

STA. 83+50.00 ℄ MH NO. 3

684.0 +

STA. 86+21.53 ℄ MH NO. 3

EX. GROUND

HGL

Asbuilt HGL

Haven SD TW=673.2'

Updated HGL

2012 MP HGL

STA 86+19.32 HGL = 671.39'

STA 86+19.33 HGL = 673.15'

Updated Q100 = 2388.5 cfs

MP Q100 = 2385.1 cfs

Updated Q100 = 1889.06 cfs

MP Q100 = 1883.2 cfs

PROFILE GRADE ℄ IMP.

S= 0.00274

659.66

660.89

STA. 86+19.32
(2) 96" RCP
Q_{100} = 546 cfs

STA 86+33
660.57 inv

STA 86+19.32
660.53 inv
Asbuilt HGL=672.9'
2012 MP HGL=671.37'

450'
(1) 16'W X 10'H RCB

HYDRAULIC DATA
Q_{100} = 2420 cfs
V_{100} = 15 fps

HYDRAULIC DATA
Q_{100} = 1741 cfs
V_{100} = 11 fps

680 670 660 650

TCE 20' EASEMENT 15' 10' EASEMENT 40'

RIVERSIDE COUNTY
SAN BERNARDINO COUNTY

℄ 16' X 10' RCB

EX. GROUND

16" WATERLINE (FUTURE)

PROFILE GRADE

FUTURE 21" SEWER LI
(PER CITY OF ONTARI

SECTION AT STA. 86+00

10' 0 10'

NOTES

(1) CONSTRUCT 16' X 10' RCB PER DETAILS ON SHEET 40.

(2) CONSTRUCT JS NO. 1 PER STD. JS226 A= 30°, B= 96", C= 31. ELEV. R= 660.94, ELEV. S= 660.87. SEE PROFILE ON SHEET 62.

(3) REMOVE EXISTING TREES AS REQUIRED FOR CONSTRUCTION.

(4) CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPL THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRA AND COVER PER SBCFC STD. 205.

(5) REMOVE AND REPLACE COW FEEDER AND METAL FENCE AS REC

(6) REMOVE AND REINSTALL EXISTING WATER FEED.

(7) PROTECT EXISTING COW SHED.

(8) CONSTRUCT MANHOLE APRON PER SBCFC STD. D260

(9) REMOVE AND REINSTALL EXISTING FENCE AS NECESSARY.

MATCH LINE SHEET 21

STA. 83+50 ℄ MH NO. 3

DEKRUYF TRUST APN 021832110

TCE

EASEMENT

84+00 85+00 86+00 87+00

N69° 55' 04"E

STA. 87+50 JS NO. 3

℄ COUNTY LINE CHANNEL

STA. 86+19.32 ℄ CLC= STA. 0+00 ℄ LAT. HAVEN-A1

SAN BERNARDINO COUNTY
RIVERSIDE COUNTY

STA. 86+21.53 ℄ MH NO. 3

P.E.= 76.18

P.E.= 76.38

TRACT NO. 29207

APN 1340406007 DEKRUYF TRUST

FUTURE BELLEGRAVE AVENUE R/W

STREET R/W

℄ HAVEN AVE

℄ SUMNER AVE

SUMNER AVE / HAVEN AVE

BCG EASEMENT

PLAN

20' 0 20'

BENCH MARK
M.L. 34-1-64.
A BRASS DISK SET IN THE TOP OF A CONCRETE POST AT THE NORTHEAST CORNER OF THE "T" INSERTSECTION OF ORANGE ST. AND SUMNER AVE 35.0' EAST OF SUMNER AVE, 21.0' NORTH OF ORANGE ST.
NAVD "88" ELEV. =609.290

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RECOMMENDED FOR APPROVAL BY: SENIOR CIVIL ENGINEER DATE: 12/20/03 R.E. No. 27090

APPROVED BY: CHIEF, DESIGN & CONSTRUCTION DATE: 12/30/03 R.E. No. 30539

REGISTERED PROFESSIONAL ENGINEER JIM M. KONG No. 27090 Exp. 3-31-05 CIVIL STATE OF CALIFORNIA

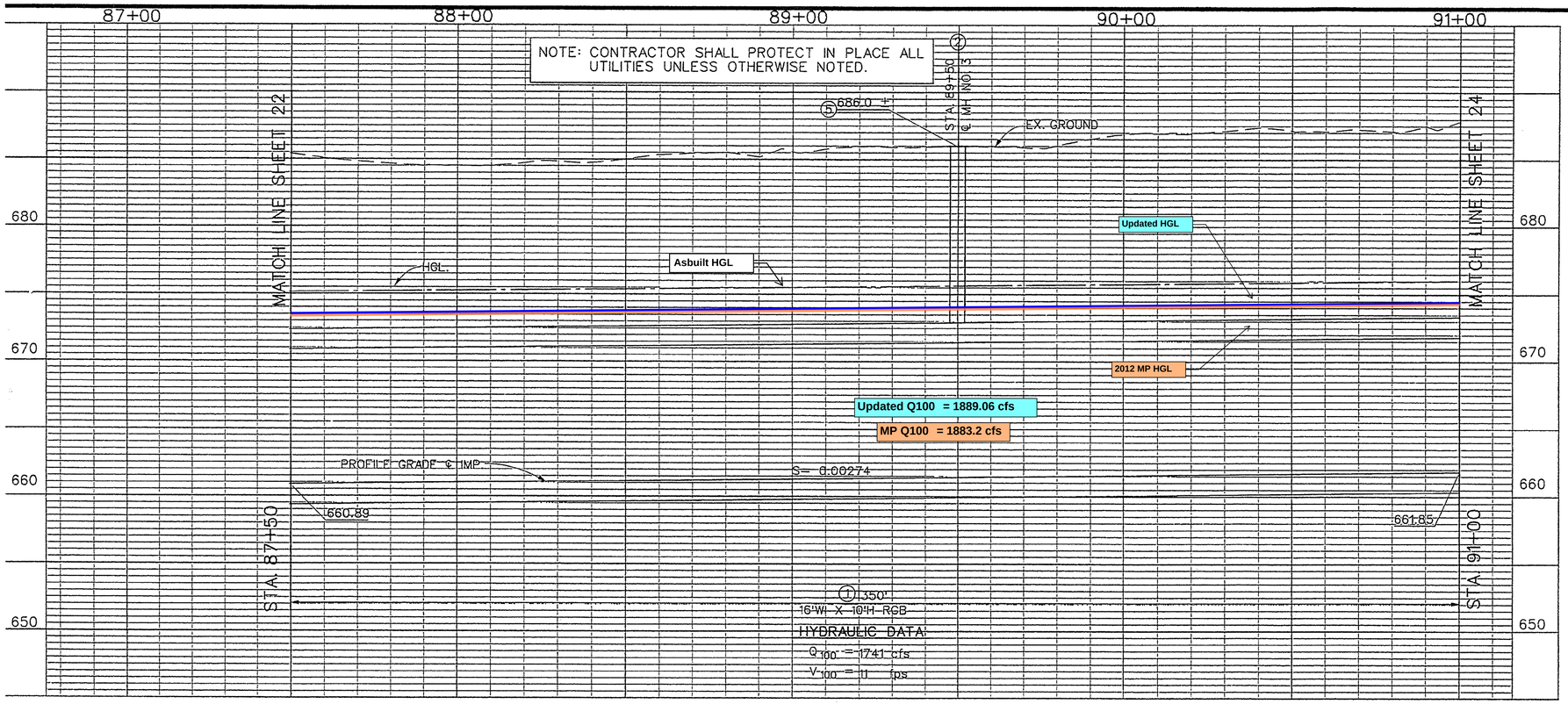
REGISTERED PROFESSIONAL ENGINEER CLYDE D. JOHNSON No. 30539 Exp. 3-31-04 CIVIL STATE OF CALIFORNIA

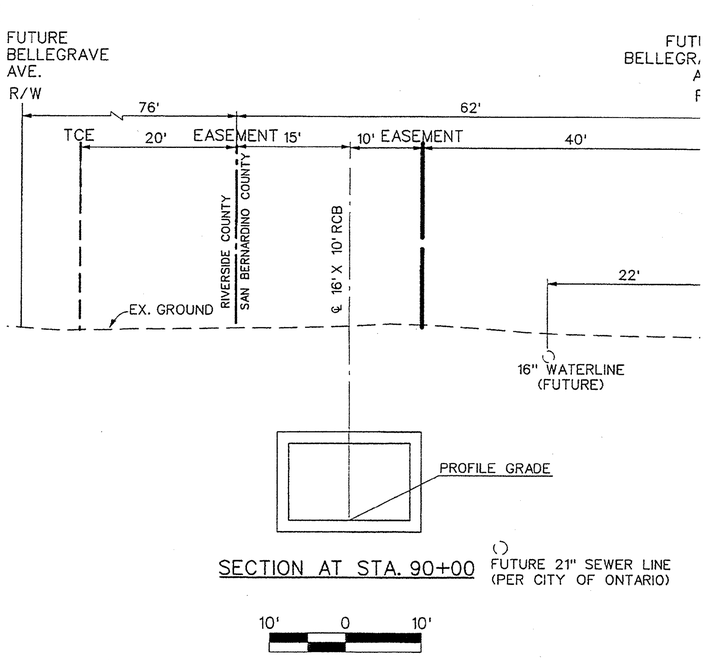
COUNTY LINE CHANNEL

STA. 83+00 TO STA. 87+50

PROJECT NO. 2-0-(
DRAWING NO. 2-3
SHEET NO. 22 OF

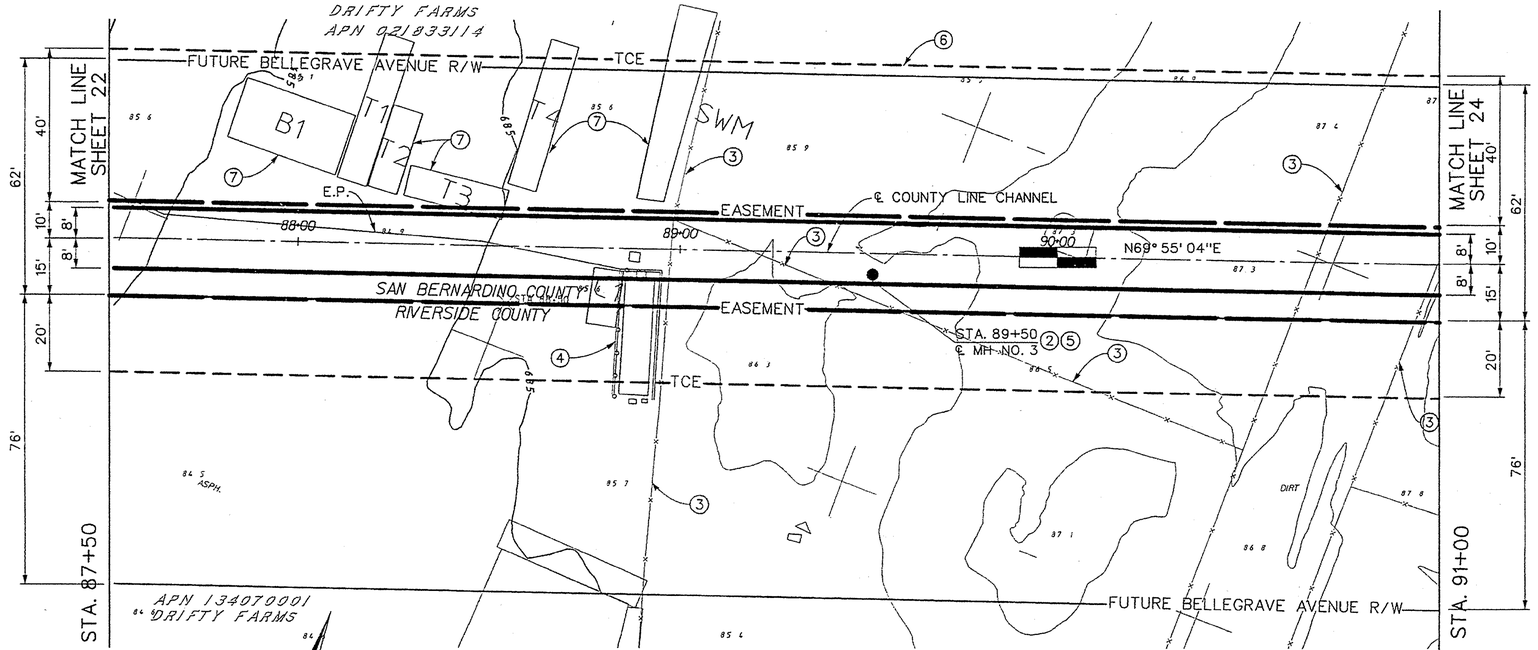
#1-317-





SECTION AT STA. 90+00

10' 0 10'



PLAN

20' 0 20'

NOTES

1. CONSTRUCT 16' X 10' RCB PER DETAILS ON SHEET 40.
2. CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPLACE THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AND COVER PER SBCFC STD. 205.
3. REMOVE EXISTING FENCE AS REQUIRED.
4. EXISTING ABOVE GROUND DIESEL STORAGE TANK TO BE RELOCATED BY OTHERS.
5. CONSTRUCT MANHOLE APRON PER SBCFC STD. D260.
6. INSTALL 6' TEMPORARY CHAIN LINK FENCE.
7. EXISTING BUILDING, TRAILERS AND RELATED STRUCTURES TO BE RELOCATED BY OTHERS.

BENCH MARK
AT THE NORTHEAST CORNER OF THE "T" INSERTSECTION OF ORANGE ST. AND SUMNER AVE 35.0' EAST OF SUMMER AVE, 21.0' NORTH OF ORANGE ST., 2.5' WEST OF POWER POLE #375282 1.0' EAST OF A MARKER POST. A BRASS DISK SET IN THE TOP OF A CONCRETE POST AND MARKED M.L. 34-1. APRIL 1964 NAVD 88 ELEV=609.29

REF.	REVISIONS	APPR.	DATE

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY:
SENIOR CIVIL ENGINEER
DATE: 12/26/03 R.E. No. 27090

APPROVED BY:
CHIEF, DESIGN & CONSTRUCTION
DATE: 12/30/03 R.E. No. 30539

REGISTERED PROFESSIONAL ENGINEER JIM M. KONG No. 27090 Exp. 3-31-05 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER CLYDE D. JOHNSON No. 30539 Exp. 3-31-04 CIVIL STATE OF CALIFORNIA

COUNTY LINE CHANNEL

STA. 87+50 TO STA. 91+00

PROJECT NO. 2-0-0
DRAWING NO. 2-31
SHEET NO. 23 OF

#1-317-1

NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES UNLESS OTHERWISE NOTED.

91+00 92+00 93+00 94+00 95+00

690 680 670 660

MATCH LINE SHEET 23

STA. 91+00

STA. 93+00 ℄ MH NO. 3 ②

685.0 + ④

EX. GROUND

HGL

Asbuilt HGL

Updated HGL

2012 MP HGL

Updated Q100 = 1889.06 cfs

MP Q100 = 1883.2 cfs

S= 0.00274

PROFILE GRADE ℄ IMP.

661.85

662.95

MATCH LINE SHEET 25

STA. 95+00

400' ①
16'W X 10'H RCB
HYDRAULIC DATA
Q_{100} = 1741 cfs
V_{100} = 11 fps

FUTURE BELLEGRAVE AVE. R/W

FUT BELLEGR. A F

76' 62'

TCE 20' EASEMENT 15' 10' EASEMENT 40'

RIVERSIDE COUNTY
SAN BERNARDINO COUNTY

℄ 16' X 10' RCB

22'

EX. GROUND

16" WATERLINE (FUTURE)

PROFILE GRADE

SECTION AT STA. 94+00

() PROPOSED 21" SEWER LINE (PER CITY OF ONTARIO)

10' 0 10'

DRIFTY FARMS
APN 021033114 ⑤

FUTURE BELLEGRAVE AVENUE R/W

TCE

MATCH LINE SHEET 23

62' 40' 10' 8' 8' 15' 20' 76'

92+00 93+00 94+00

EASEMENT

℄ COUNTY LINE CHANNEL

N69° 55' 04"E

SAN BERNARDINO COUNTY
RIVERSIDE COUNTY

EASEMENT

STA. 93+00 ℄ MH NO. 3 ② ④

TCE

APN 1340710001
DRIFTY FARMS

FUTURE BELLEGRAVE AVENUE R/W

MATCH LINE SHEET 25

40' 62' 8' 10' 8' 15' 20' 76'

STA. 91+00

STA. 95+00

N

PLAN

20' 0 20'

NOTES

① CONSTRUCT 16' X 10' RCB PER DETAILS ON SHEET 40.

② CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPLACE THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AND COVER PER SBCFC STD. 205.

③ REMOVE AND REINSTALL EXISTING FENCE AS REQUIRED.

④ CONSTRUCT MANHOLE APRON PER SBCFC STD. D260.

⑤ INSTALL 6' TEMPORARY CHAIN LINK FENCE.

REGISTERED PROFESSIONAL ENGINEER
JIM M. KONIG
No. 27090
Exp. 3-31-05
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
CLYDE D. JOHNSON
No. 30539
Exp. 3-31-04
CIVIL
STATE OF CALIFORNIA

#1-317-1

BENCH MARK

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RECOMMENDED FOR APPROVAL BY:
SENIOR CIVIL ENGINEER
DATE: 12/29/03 R.E. No. 27090

APPROVED BY:
CHIEF, DESIGN & CONSTRUCTION
DATE: 12/30/03 R.E. No. 30539

COUNTY LINE CHANNEL

STA. 91+00 TO STA. 95+00

PROJECT NO. 2-0-0
DRAWING NO. 2-31
SHEET NO. 24 OF 1

NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES UNLESS OTHERWISE NOTED.

95+00 96+00 97+00 98+00 99+00

690 680 670 660

MATCH LINE SHEET 24

STA. 95+00

STA. 97+00 ℄ MH NO. 3

688.4 ± (A) (2)

EX. GROUND

HGL

Asbuilt HGL

Updated HGL

2012 MP HGL

Updated Q100 = 1889.06 cfs

MP Q100 = 1883.2 cfs

PROFILE GRADE ℄ IMP.

S= 0.0027/A

662.95

664.05

MATCH LINE SHEET 26

STA. 98+00

400' (1)

16'W X 10'H RCB

HYDRAULIC DATA

Q_{100} = 1741 cfs

V_{100} = 11 fps

FUTURE BELLEGRAVE AVE. R/W

FUTU BELLEGRA A

76' 62'

TCE 20' EASEMENT 15' 10' EASEMENT 40'

RIVERSIDE COUNTY
SAN BERNARDINO COUNTY

℄ 16' X 10' RCB

22'

EX. GROUND

16" WATERLINE (FUTURE)

PROFILE GRADE

SECTION AT STA. 98+00

(2) FUTURE 21" SEWER LINE (PER CITY OF ONTARIO)

10' 0 10'

DRIFTY FARMS
APN 021033114

FUTURE BELLEGRAVE AVENUE R/W

TCE

MATCH LINE SHEET 24

62' 40' 10' 8' 8' 15' 20' 76'

℄ COUNTY LINE CHANNEL

STA. 97+00 (2) (4)
℄ MH NO. 3

EASEMENT

96+00 97+00 98+00

B-12

SCATTERED BRUSH

N69° 55' 04"E

STA. 95+00

(3)

SAN BERNARDIINO COUNTY
RIVERSIDE COUNTY

EASEMENT

TCE

MATCH LINE SHEET 26

62' 40' 10' 8' 8' 15' 20' 76'

APN 134070001
&DRIFTY FARMS

FUTURE BELLEGRAVE AVENUE R/W

STA. 99+00

N

PLAN

20' 0 20'

NOTES

(1) CONSTRUCT 16' X 10' RCB PER DETAILS ON SHEET 40.

(2) CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPLACE THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AND COVER PER SBCFC STD. 205.

(3) EXISTING POWER POLE TO BE RELOCATED BY OTHERS.

(4) CONSTRUCT MANHOLE APRON PER SBCFC STD. D260.

REGISTERED PROFESSIONAL ENGINEER
JIM M. KONG
No. 27090
Exp. 3-31-05
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
CLYDE D. JOHNSON
No. 30539
Exp. 3-31-04
CIVIL
STATE OF CALIFORNIA

#1-317-1

BENCH MARK

REF.	REVISIONS	APPR.	DATE

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY:
SENIOR CIVIL ENGINEER
DATE: 12/30/03 R.E. No. 27090

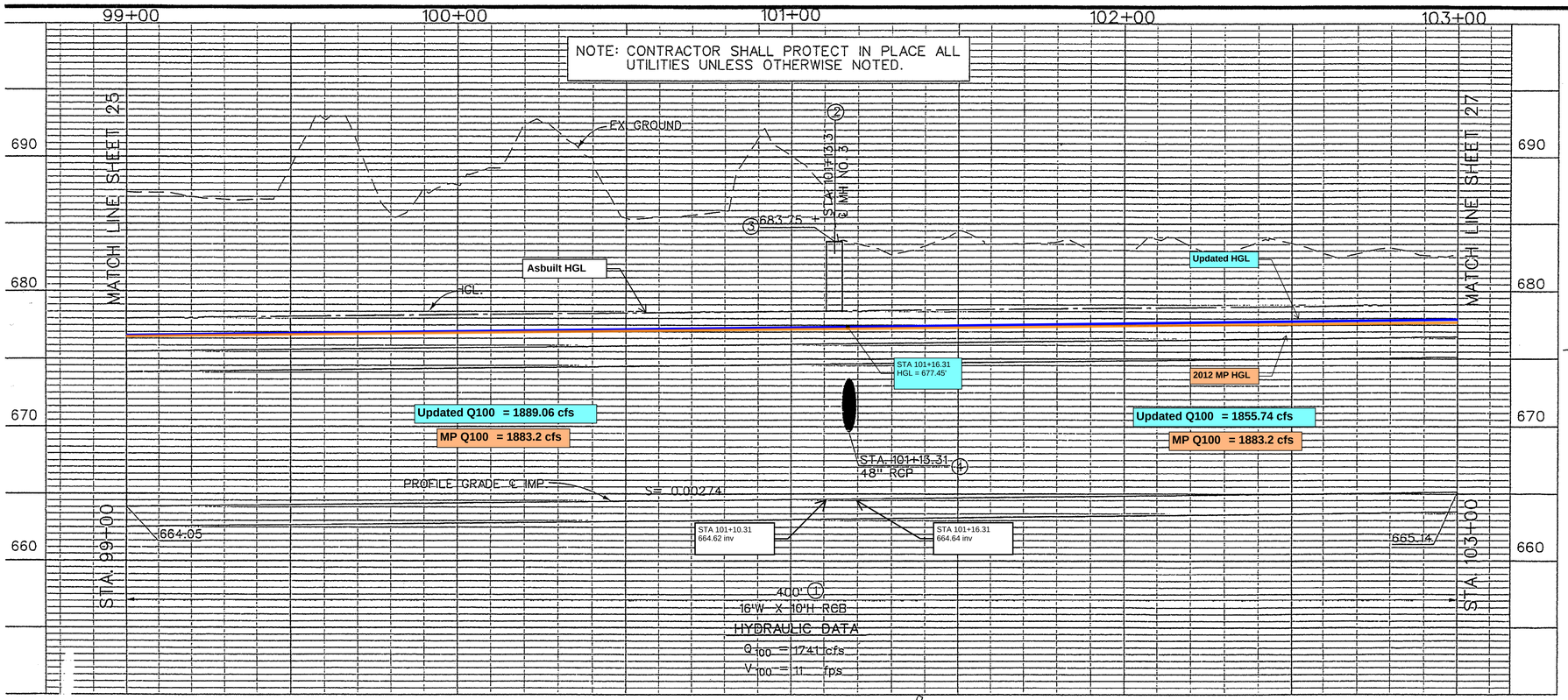
APPROVED BY:
CHIEF, DESIGN & CONSTRUCTION
DATE: 12/30/03 R.E. No. 30539

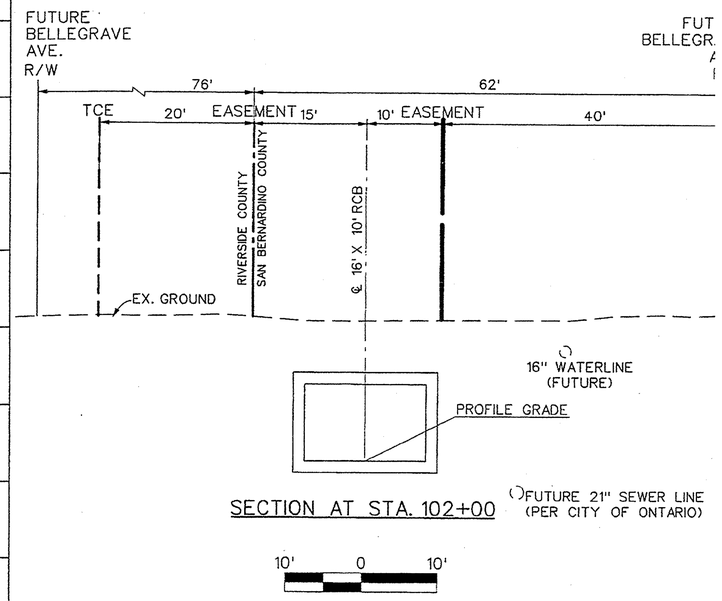
COUNTY LINE CHANNEL

STA. 95+00 TO STA. 99+00

PROJECT NO. 2-0-0
DRAWING NO. 2-31
SHEET NO. 25 OF 1

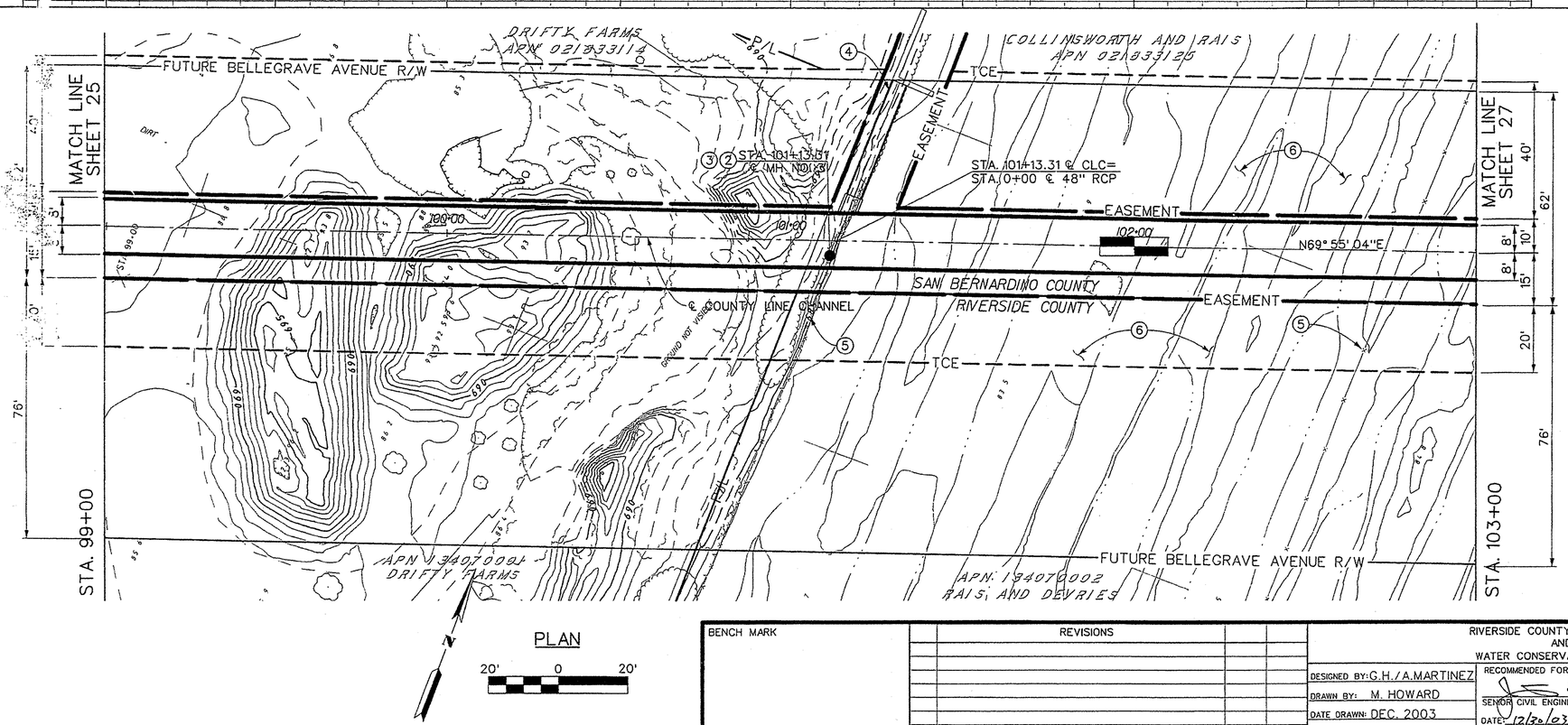
NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES UNLESS OTHERWISE NOTED.





SECTION AT STA. 102+00

10' 0 10'



PLAN

20' 0 20'

NOTES

1. CONSTRUCT 16' X 10' RCB PER DETAILS ON SHEET 40.
2. CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPLACE THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AND COVER PER SBCFC STD. 205.
3. CONSTRUCT MANHOLE APRON PER SBCFC STD. D260.
4. INSTALL 48" RCP CONNECTOR PER DETAILS ON SHEET 69.
5. REMOVE AND REINSTALL EXISTING FENCE AS REQUIRED.
6. RESTORE EXISTING SWALE TO ORIGINAL CONDITION AFTER CONSTRUCTION.

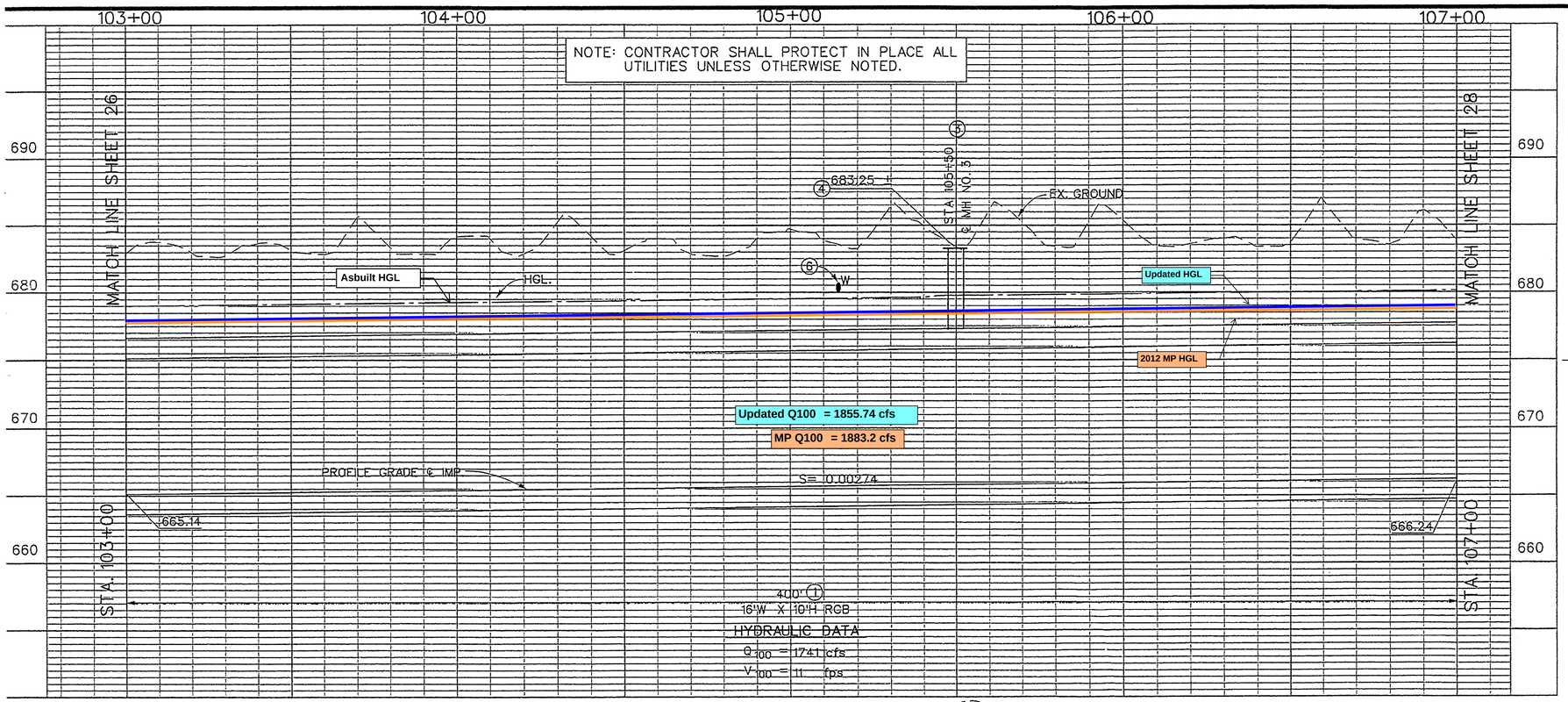
REGISTERED PROFESSIONAL ENGINEER JIM M. KONG No. 27090 Exp. 3-31-05 CIVIL STATE OF CALIFORNIA

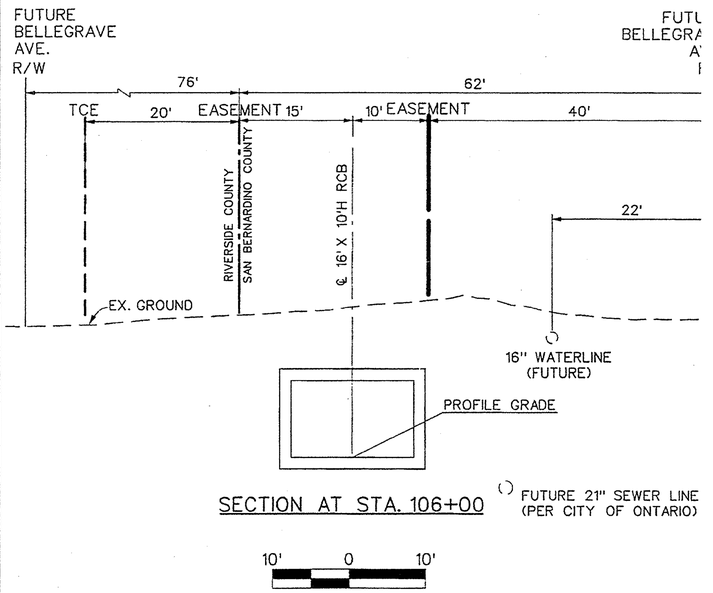
REGISTERED PROFESSIONAL ENGINEER CLYDE D. JOHNSON No. 30539 Exp. 3-31-04 CIVIL STATE OF CALIFORNIA

#1-317-1

BENCH MARK	REVISIONS			RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT	COUNTY LINE CHANNEL
	REF.	DESCRIPTION	APPR. DATE	DESIGNED BY: G.H./A.MARTINEZ DRAWN BY: M. HOWARD DATE DRAWN: DEC. 2003 CHECKED BY:	RECOMMENDED FOR APPROVAL BY: SENIOR CIVIL ENGINEER DATE: 12/30/03 R.E. No. 27090 APPROVED BY: CHIEF, DESIGN & CONSTRUCTION DATE: 12/30/03 R.E. No. 30539
					STA. 99+00 TO STA. 103+00

PROJECT NO. 2-0-0
DRAWING NO. 2-31
SHEET NO. 26 OF





SECTION AT STA. 106+00

FUTURE 21" SEWER LINE (PER CITY OF ONTARIO)

PLAN

20' 0 20'

NOTES

1. CONSTRUCT 16' X 10' RCB PER DETAILS ON SHEET 40.
2. REMOVE AND REINSTALL EXISTING FENCE AS REQUIRED.
3. CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPLACE THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AND COVER PER SBCFC STD. 205.
4. CONSTRUCT MANHOLE APRON PER SBCFC STD. D260.
5. RESTORE EXISTING SWALE TO ORIGINAL CONDITION AFTER CONSTRUCTION.
6. MAINTAIN THE OPERATION OF THE EXISTING DAIRY WASTE WATER DISTRIBUTION SYSTEM DURING CONSTRUCTION. RELOCATE AND REPLACE THE WATER LINE AS REQUIRED.

REGISTERED PROFESSIONAL ENGINEER — JIM M. KONG — No. 27090 Exp. 3-31-05 — CIVIL — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — CLYDE D. JOHNSON — No. 30539 Exp. 3-31-04 — CIVIL — STATE OF CALIFORNIA

#1-317-1

BENCH MARK

REVISIONS			
REF	DESCRIPTION	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RECOMMENDED FOR APPROVAL BY: SENIOR CIVIL ENGINEER DATE: 12/20/03 R.E. No. 27090

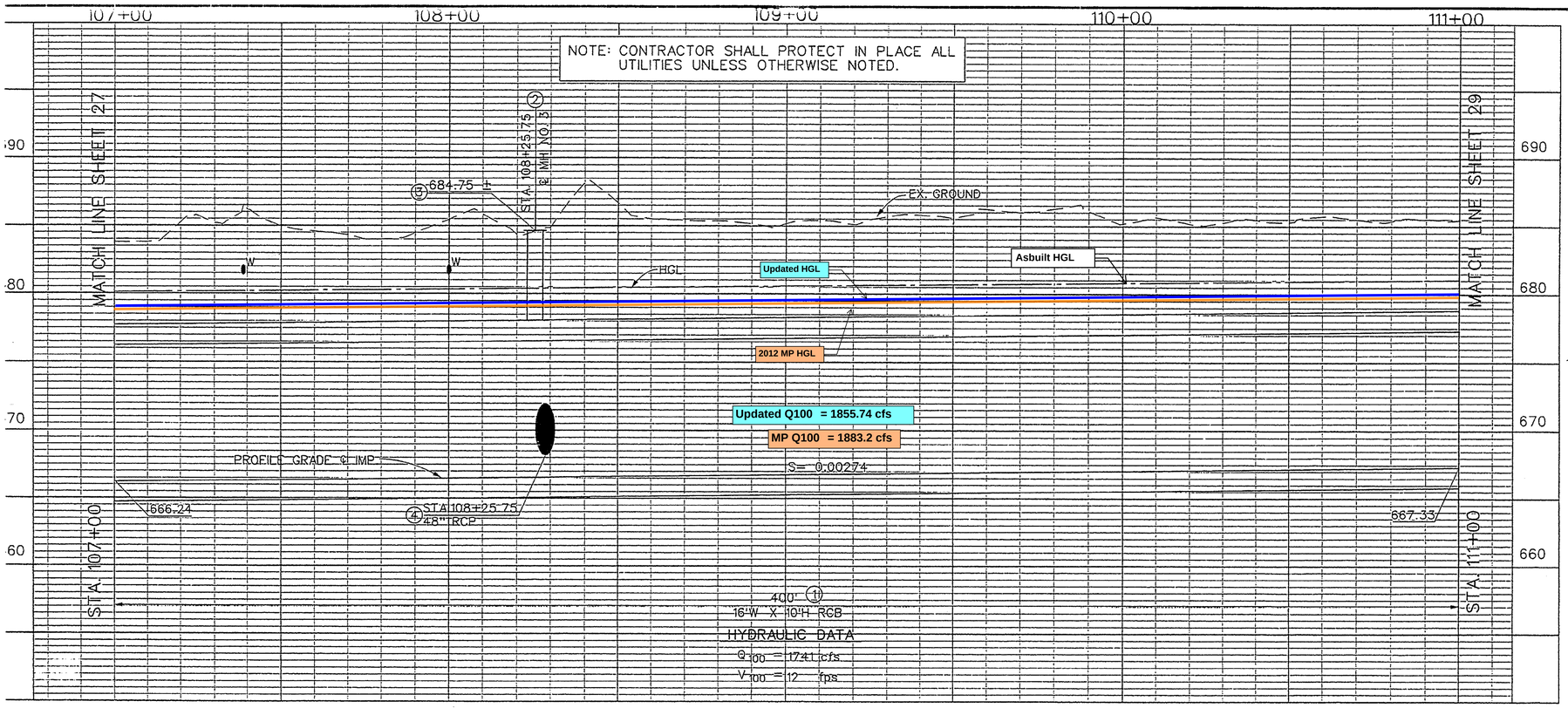
APPROVED BY: CHIEF, DESIGN & CONSTRUCTION DATE: 1/6/04 R.E. No. 30539

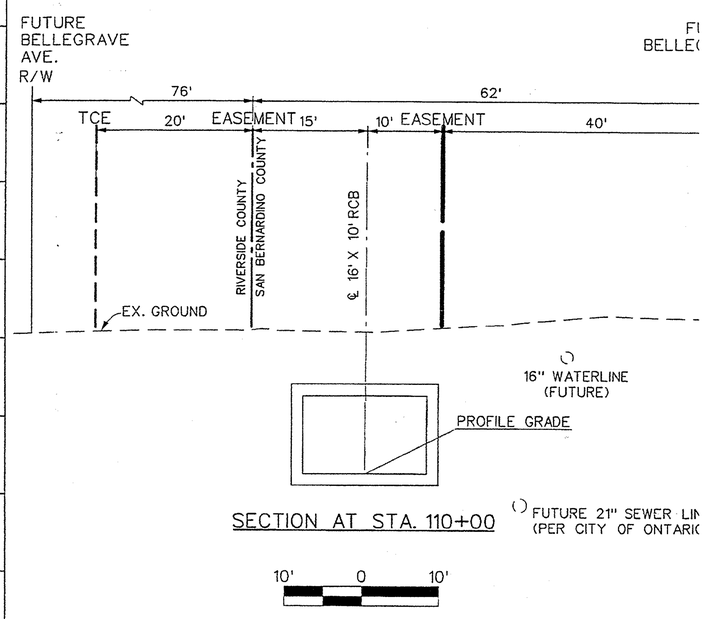
COUNTY LINE CHANNEL

STA. 103+00 TO STA. 107+00

PROJECT NO. 2-0-C
DRAWING NO. 2-3
SHEET NO. 27 OF

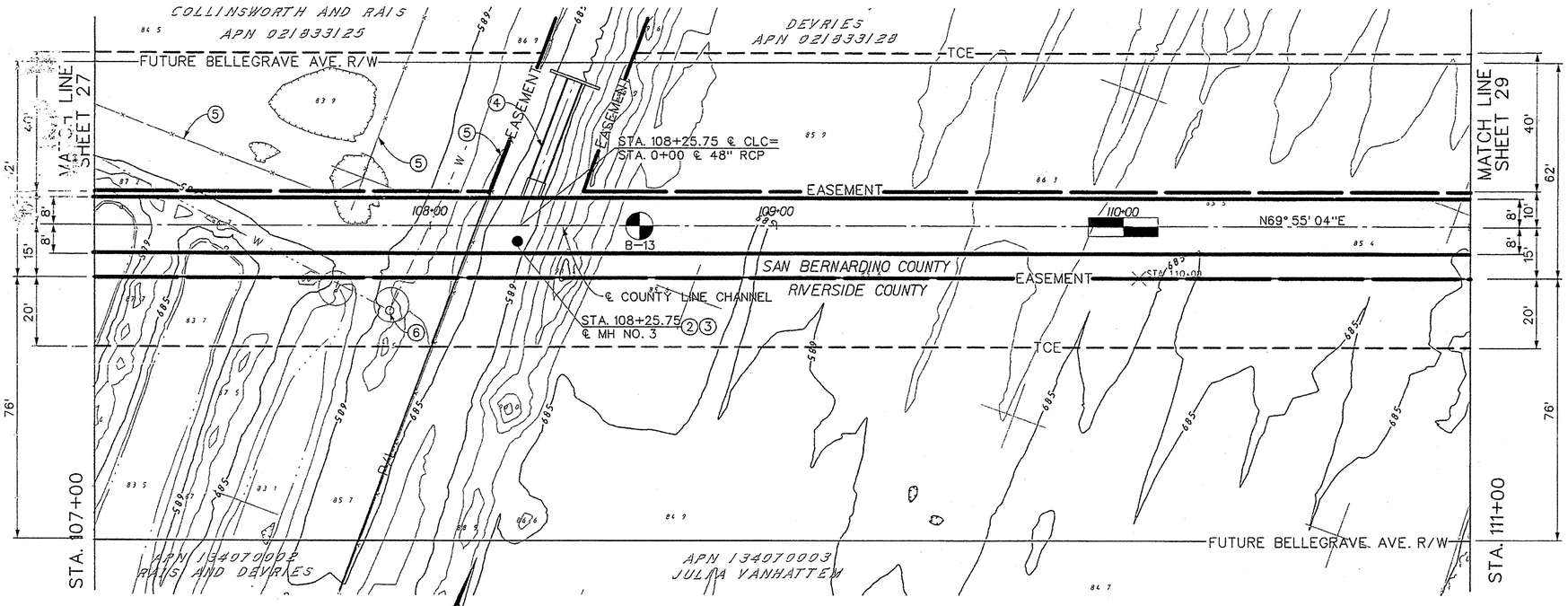
NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES UNLESS OTHERWISE NOTED.





SECTION AT STA. 110+00

10' 0 10'



PLAN

20' 0 20'

NOTES

① CONSTRUCT 16' X 10' RCB PER DETAILS ON SHEET 40.

② CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPLACE THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AND COVER PER SBCFC STD. 205.

③ CONSTRUCT MANHOLE APRON PER SBCFC STD. D260.

④ INSTALL 48" RCP CONNECTOR PER DETAILS ON SHEET 70.

⑤ REMOVE AND REINSTALL EXISTING FENCE AS REQUIRED.

⑥ MAINTAIN THE OPERATION OF THE EXISTING DAIRY WASTE WATER DISTRIBUTION SYSTEM DURING CONSTRUCTION. RELOCATE AND REPLACE THE WATER LINE AS REQUIRED.

REGISTERED PROFESSIONAL ENGINEER — J.M. M. KONIG — No. 27090 Exp. 3-31-05 — CIVIL — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — CLYDE D. JOHNSON — No. 30539 Exp. 3-31-04 — CIVIL — STATE OF CALIFORNIA

#1-317-1

BENCH MARK

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RECOMMENDED FOR APPROVAL BY: SENIOR CIVIL ENGINEER
DATE: 12/30/03 R.E. No. 27090

APPROVED BY: CHIEF, DESIGN & CONSTRUCTION
DATE: 1/2/04 R.E. No. 30539

COUNTY LINE CHANNEL

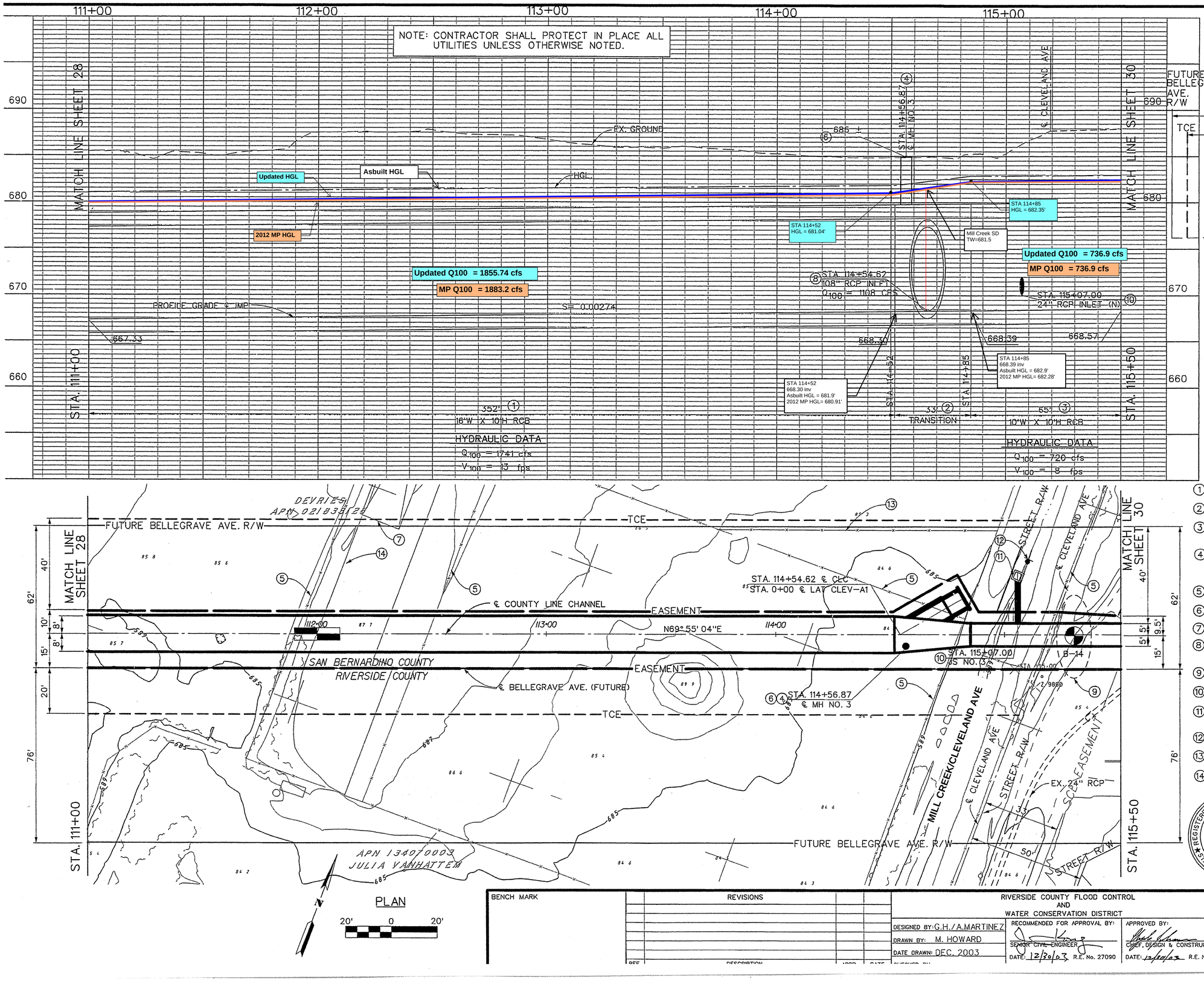
STA. 107+00 TO STA. 111+00

PROJECT NO. 2-0-

DRAWING NO. 2-

SHEET NO. 28 OF

NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES UNLESS OTHERWISE NOTED.



NOTES

1. CONSTRUCT 16' X 10' RCB PER DETAILS ON SHEET 40.
2. CONSTRUCT TRANSITION STRUCTURE NO. 2 PER STD. TS302.
3. CONSTRUCT 10' X 10' RCB PER CALTRANS STD. D80. TRANSVERSE CONSTRUCTION JOINT PER NOTE 6 ON SHEET 38.
4. CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO PLAC REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AI COVER PER SBCFC STD. 205.
5. REMOVE AND REINSTALL EXISTING FENCE AS REQUIRED.
6. CONSTRUCT MANHOLE APRON PER SBCFC STD. D260.
7. PROTECT EXISTING COW SHED.
8. CONSTRUCT JS NO. 1 PER STD. JS226. A= 30°, B= 108", C= 23. ELEV. R= 668.85, ELEV. S= 668.7. SEE PROFILE ON SHEET 63.
9. CAUTION, LOW HANGING WIRES.
10. CONSTRUCT JS NO. 3 PER STD. JS228.
11. CONSTRUCT CONCRETE DROP INLET WITH NORTH AND WEST SIDES OPEN PER STD. CB110, V= 4.0'. SEE PROFILE ON SHEET 71
12. INSTALL TYPE L-1 MARKER PER CALTRANS STD. A73A.
13. INSTALL 5' TEMPORARY METAL FENCE PER DETAIL ON SHEET 72.
14. REMOVE EXISTING COW FEEDER AS REQUIRED.

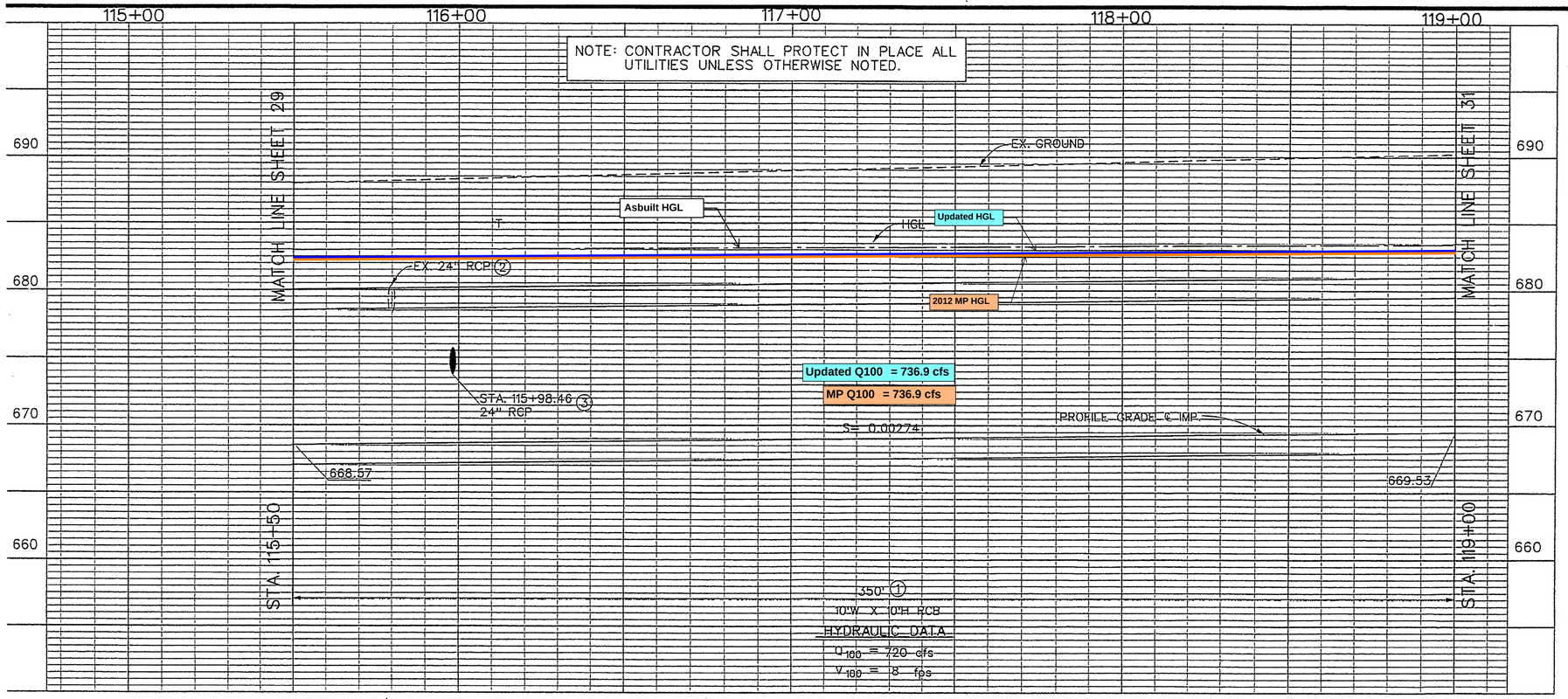
REGISTERED PROFESSIONAL ENGINEER — JIM M. KONG — No. 27090 Exp. 3-31-05 — CIVIL — STATE OF CALIFORNIA

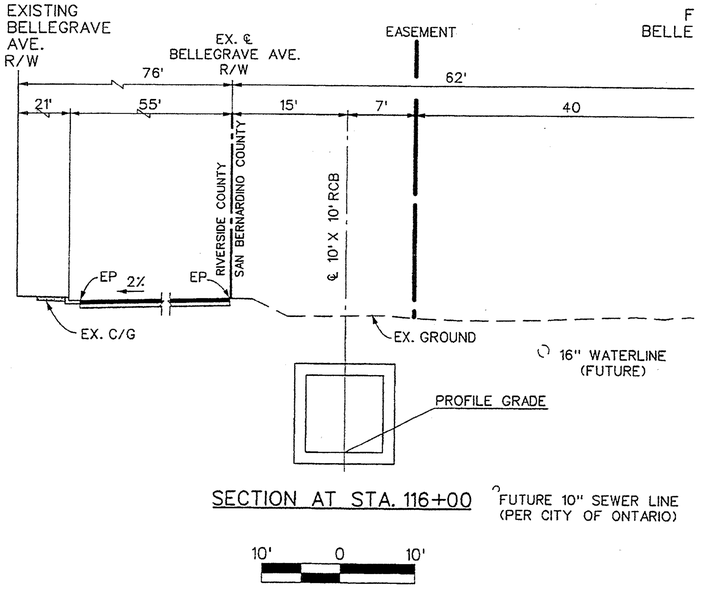
REGISTERED PROFESSIONAL ENGINEER — CLYDE D. JOHNSSON — No. 30539 Exp. 3-31-04 — CIVIL — STATE OF CALIFORNIA

#1-317-

BENCH MARK	REVISIONS	RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT			COUNTY LINE CHANNEL	PROJECT NO. 2-0-0
		DESIGNED BY: G.H./A.MARTINEZ	RECOMMENDED FOR APPROVAL BY:	APPROVED BY:	STA. 111+00 TO STA. 115+50	DRAWING NO. 2-31
		DRAWN BY: M. HOWARD	SENIOR CIVIL ENGINEER	CHIEF, DESIGN & CONSTRUCTION		SHEET NO. 29 OF
		DATE DRAWN: DEC. 2003	DATE: 12/30/03 R.E. No. 27090	DATE: 12/30/03 R.E. No. 30539		

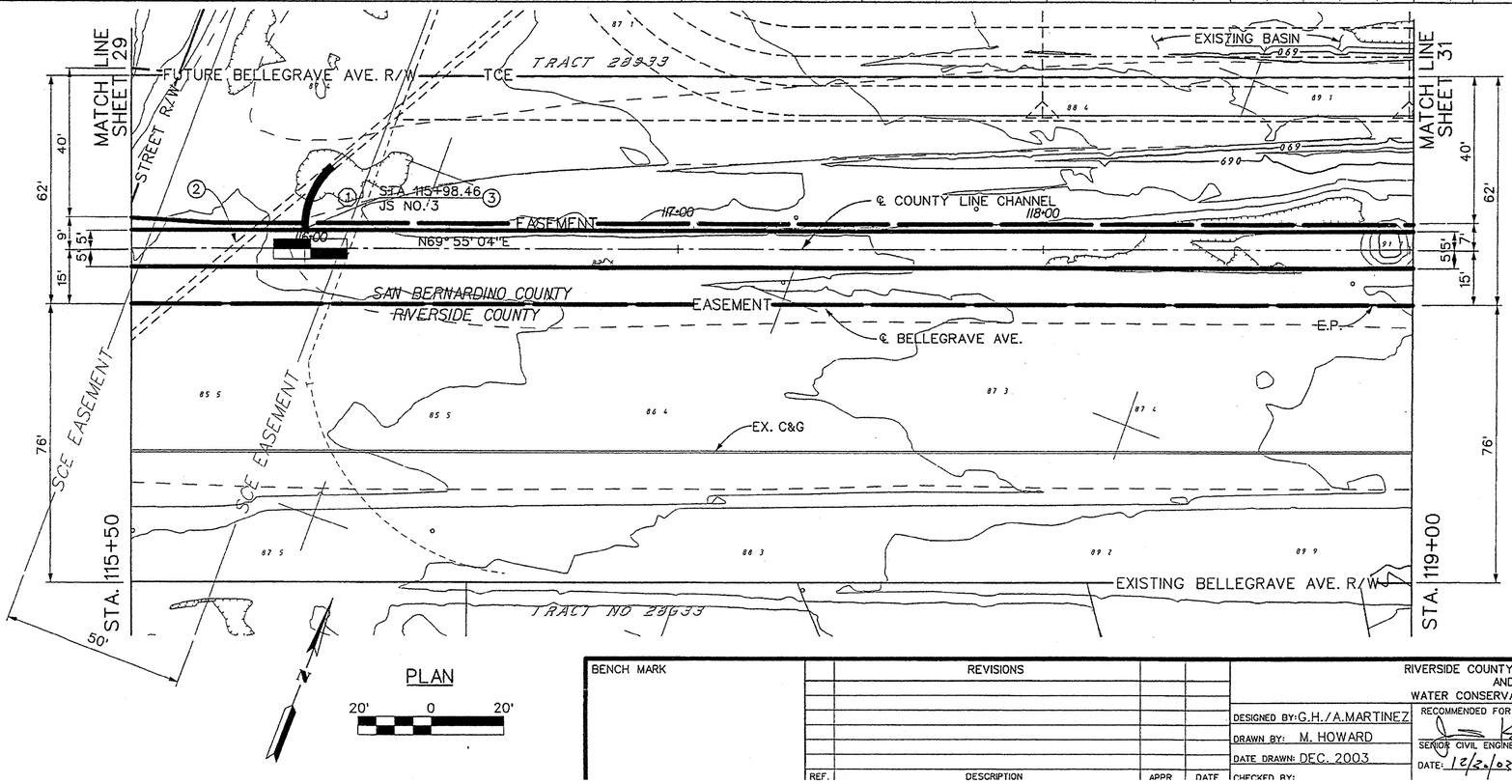
NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES UNLESS OTHERWISE NOTED.





SECTION AT STA. 116+00

10' 0 10'



PLAN

20' 0 20'

NOTES

1. CONSTRUCT 10' X 10' RCB PER CALTRANS STD. D80. TRANSVERSE CONSTRUCTION JOINT PER NOTE 6 ON SHEET 38.
2. REMOVE INTERFERING PORTION OF EXISTING 24" RCP AND PLUG.
3. CONSTRUCT JS NO. 3 PER STD. JS228. SEE DETAILS ON SHEET 63.

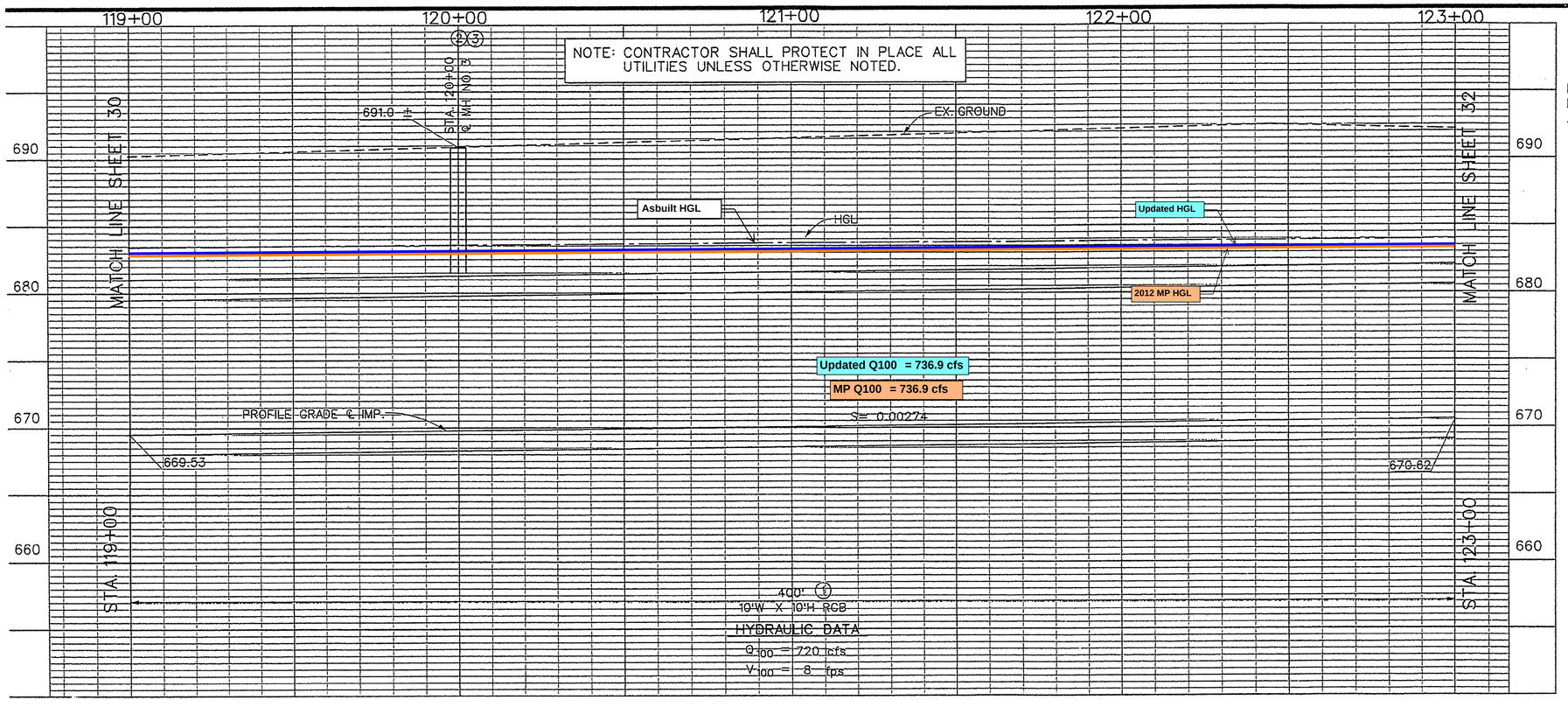
℄ 24" RCP
(1) CURVE DATA
Δ = 49° 48' 23.29"
R = 22.5'
L = 19.56'
T = 10.45'
BC= STA. 0+10.00
EC= STA. 0+29.56
PI = N 2304882.260
E 6162467.118

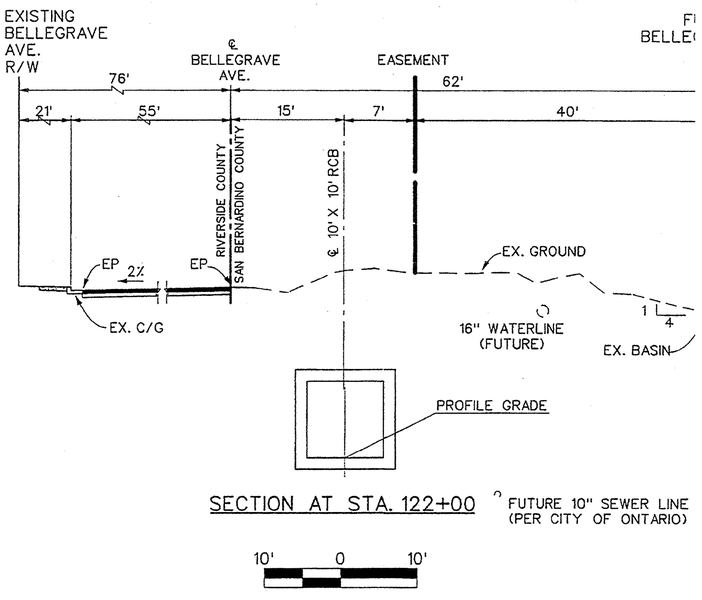
REGISTERED PROFESSIONAL ENGINEER — JIM M. KONG — No. 27090 Exp. 3-31-05 — CIVIL — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — CLYDE D. JOHNSON — No. 30539 Exp. 3-31-04 — CIVIL — STATE OF CALIFORNIA

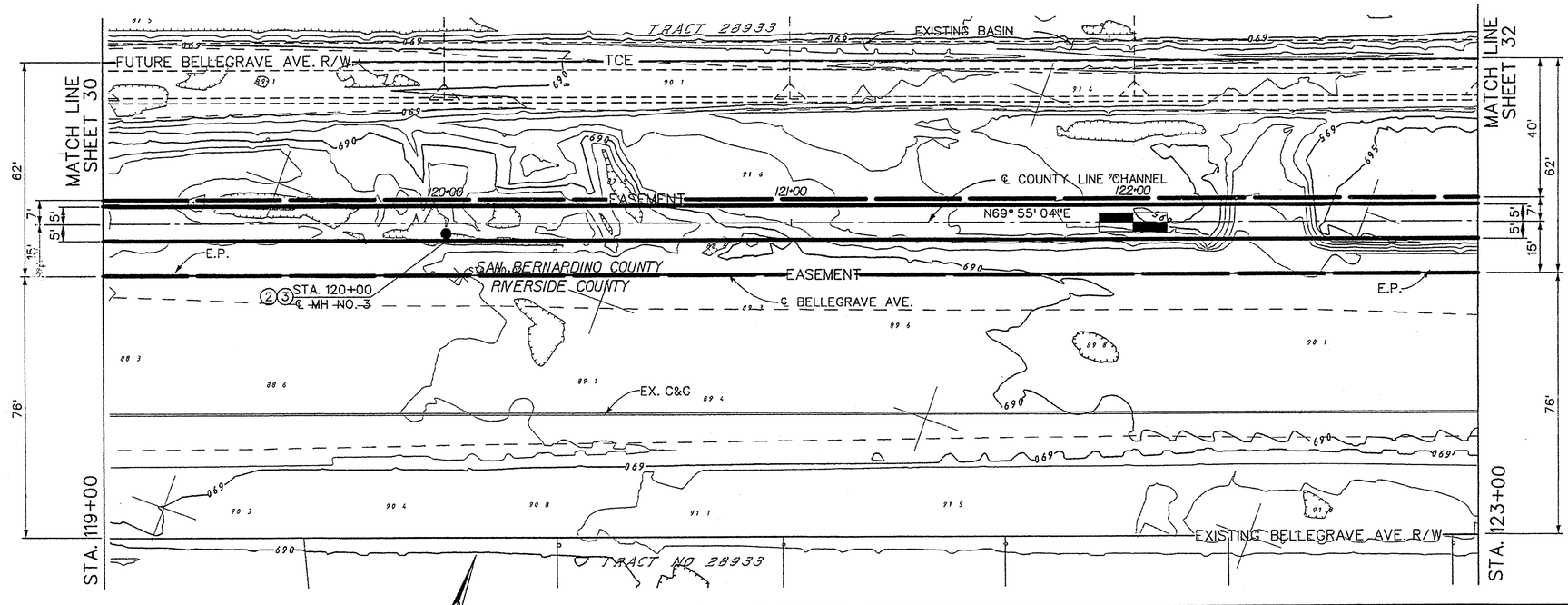
#1-317-1

BENCH MARK	REVISIONS			RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT			COUNTY LINE CHANNEL	PROJECT NO. 2-0-03
	REF.	DESCRIPTION	APPR. DATE	DESIGNED BY: G.H./A.MARTINEZ	RECOMMENDED FOR APPROVAL BY: SENIOR CIVIL ENGINEER DATE: 12/2/03 R.E. No. 27090	APPROVED BY: CHIEF, DESIGN & CONSTRUCTION DATE: 12/10/03 R.E. No. 30539	STA. 115+50 TO STA. 119+00	DRAWING NO. 2-315
				DRAWN BY: M. HOWARD				SHEET NO. 30 OF 1
				DATE DRAWN: DEC. 2003				
				CHECKED BY:				





SECTION AT STA. 122+00



PLAN

20' 0 20'

NOTES

1. CONSTRUCT 10' X 10' RCB PER CALTRANS STD. D80. TRANSVERSE CONSTRUCTION JOINT PER NOTE 6 ON SHEET 38.
2. CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPLACE THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AND COVER PER SBCFC STD. 205.
3. CONSTRUCT MANHOLE APRON PER SBCFC STD. D260.

REGISTERED PROFESSIONAL ENGINEER — JIM M. KONG — No. 27090 Exp. 3-31-05 — CIVIL — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — CLYDE D. JOHNSON — No. 30539 Exp. 3-31-04 — CIVIL — STATE OF CALIFORNIA

#1-317-1

BENCH MARK

REVISIONS			
REF	DESCRIPTION	APPR	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RECOMMENDED FOR APPROVAL BY:
SENIOR CIVIL ENGINEER
DATE: 12/20/03 R.E. No. 27090

APPROVED BY:
CHIEF, DESIGN & CONSTRUCTION
DATE: 12/30/03 R.E. No. 30539

COUNTY LINE CHANNEL

STA. 119+00 TO STA. 123+00

PROJECT NO. 2-0-0
DRAWING NO. 2-31
SHEET NO. 31 OF

NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES UNLESS OTHERWISE NOTED.

123+00 124+00 125+00 126+00 127+00

690 680 670 660

MATCH LINE SHEET 31

MATCH LINE SHEET 33

STA. 123+00

STA. 127+00

691.5 H

STA. 124+00 ℄ MH NO 3

EX. GROUND

Updated HGL

HGL

Asbuilt HGL

2012 MP HGL

Updated Q100 = 736.9 cfs

MP Q100 = 736.9 cfs

S= 0.00274

PROFILE GRADE ℄ IMP.

670.62

671.72

400' ①

10'W X 10'H RCB

HYDRAULIC DATA

Q_{100} = 720 cfs

V_{100} = 9 fps

EXISTING BELLEGRAVE AVE. R/W

℄ BELLEGRAVE AVE.

EASEMENT

76' 62' 21' 55' 15' 7' 40'

RIVERSIDE COUNTY SAN BERNARDINO COUNTY

℄ 10' X 10' RCB

EP 2% EP

EX. C/G

EX. GROUND

16" WATERLINE (FUTURE)

1 4

EX. BASIN

PROFILE GRADE

SECTION AT STA. 124+00

FUTURE 10" SEWER LINE (PER CITY OF ONTARIO)

10' 0 10'

EXISTING BASIN

TRACT NO 28933

EXISTING DITCH CHANNEL

TCE

FUTURE BELLEGRAVE AVE. R/W

124+00 125+00 126+00

EASEMENT

N69° 55' 04"E

62' 7' 5' 5' 15' 76'

EP

STA. 124+00 ℄ MH NO. 3

℄ COUNTY LINE CHANNEL

B-15

℄ BELLEGRAVE AVE.

SAN BERNARDINO COUNTY

RIVERSIDE COUNTY

E.P.

EX. C&G

EASEMENT

EXISTING BELLEGRAVE AVE. R/W

TRACT NO 28933

40' 62' 7' 5' 5' 15' 76'

PLAN

20' 0 20'

NOTES

① CONSTRUCT 10' X 10' RCB PER CALTRANS STD. D80. TRANSVERSE CONSTRUCTION JOINT PER NOTE 6 ON SHEET 38.

② CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPLACE THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AND COVER PER SBCFC STD. 205.

③ CONSTRUCT MANHOLE APRON PER SBCFC STD. D260.

REGISTERED PROFESSIONAL ENGINEER JIM M. KONG No. 27090 Exp. 3-31-05 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER CLYDE D. JOHNSON No. 30539 Exp. 3-31-04 CIVIL STATE OF CALIFORNIA

#1-317-1

BENCH MARK

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

RECOMMENDED FOR APPROVAL BY: SENIOR CIVIL ENGINEER DATE: 12/20/03 R.E. No. 27090

APPROVED BY: CHIEF DESIGN & CONSTRUCTION DATE: 12/16/03 R.E. No. 30539

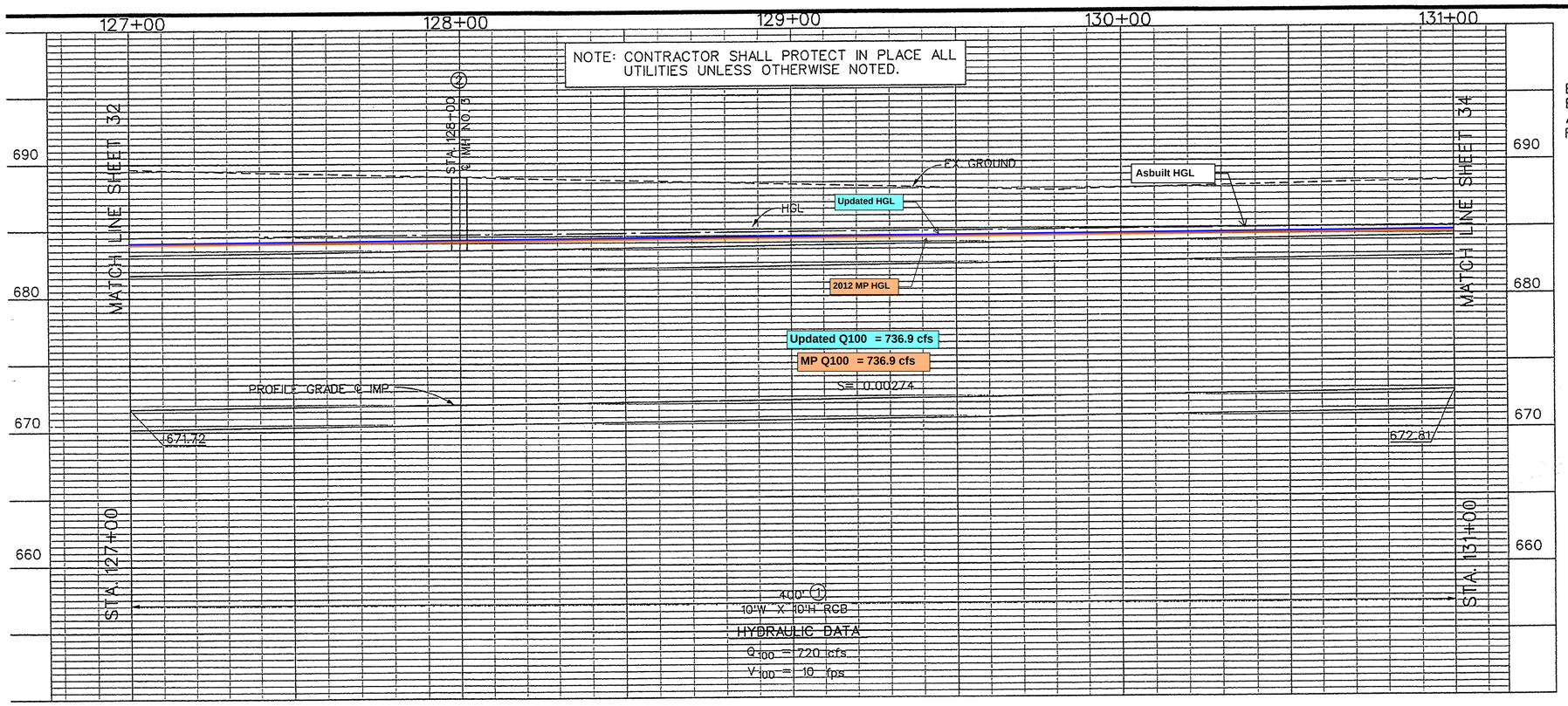
COUNTY LINE CHANNEL

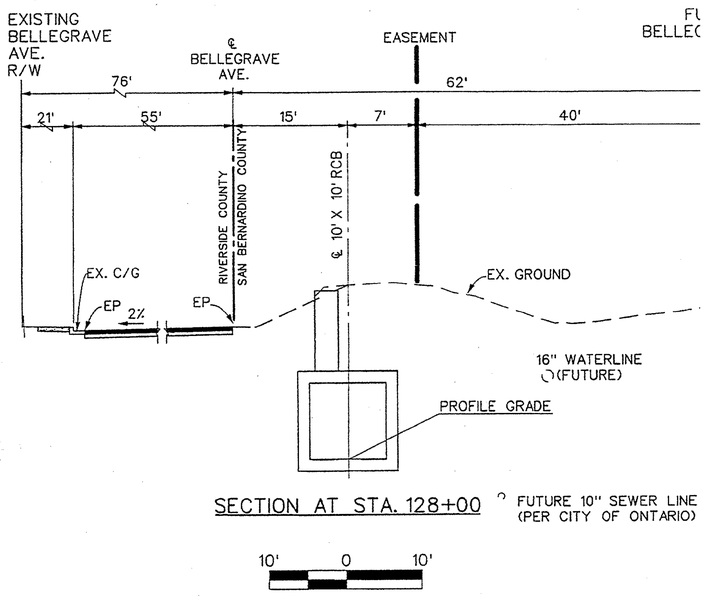
STA. 123+00 TO STA. 127+00

PROJECT NO 2-0-(

DRAWING NO. 2-3

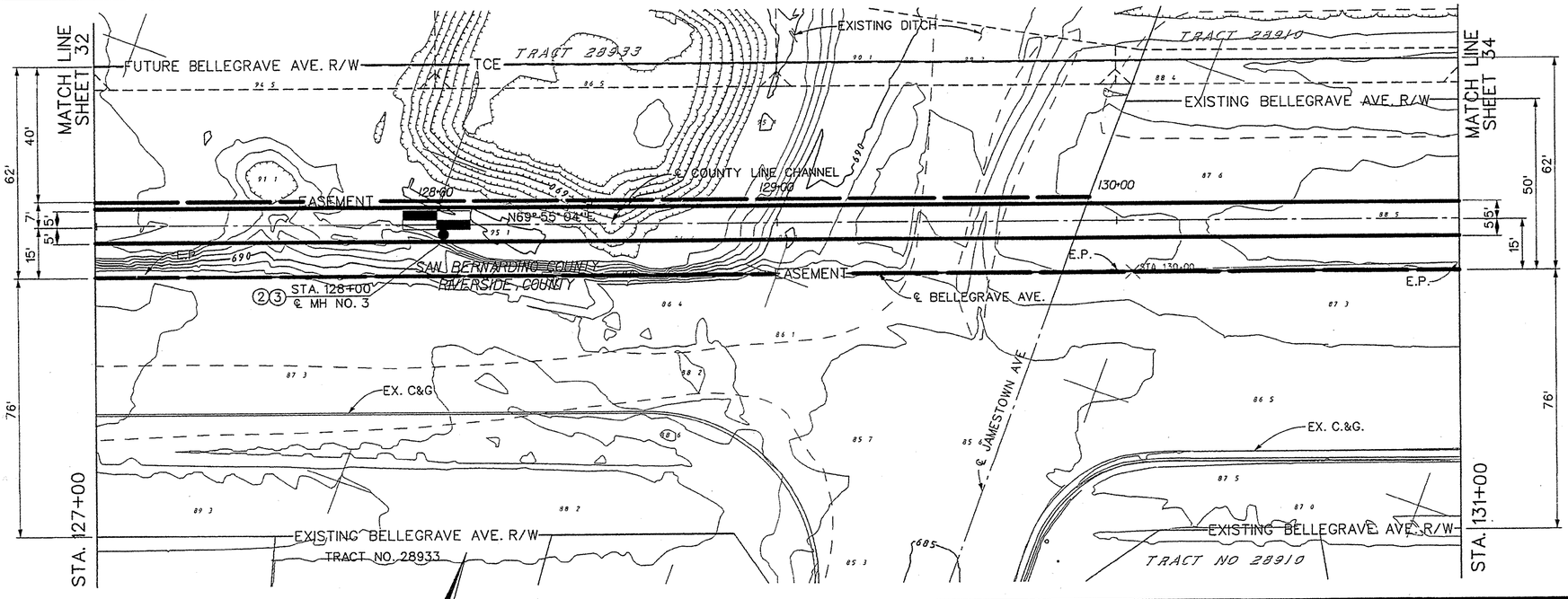
SHEET NO. 32 OF





SECTION AT STA. 128+00 ② FUTURE 10" SEWER LINE (PER CITY OF ONTARIO)

10' 0 10'



PLAN

N

20' 0 20'

NOTES

① CONSTRUCT 10' X 10' RCB PER CALTRANS STD. D80. TRANSVERSE CONSTRUCTION JOINT PER NOTE 6 ON SHEET 38.

② CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPLACE THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AND COVER PER SBCFC STD. 205.

③ CONSTRUCT MANHOLE APRON PER SBCFC STD. D260.

REGISTERED PROFESSIONAL ENGINEER — JIM M. KONG — No. 27090 Exp. 3-31-05 — CIVIL — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — CLYDE D. JOHNSON — No. 30539 Exp. 3-31-04 — CIVIL — STATE OF CALIFORNIA

#1-317-1

BENCH MARK

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RECOMMENDED FOR APPROVAL BY:
SENIOR CIVIL ENGINEER
DATE: 12/20/03 R.E. No. 27090

APPROVED BY:
CHIEF, DESIGN & CONSTRUCTION
DATE: 12/30/03 R.E. No. 30539

COUNTY LINE CHANNEL

STA. 127+00 TO STA. 131+00

PROJECT NO. 2-0-(
DRAWING NO. 2-3
SHEET NO. 33 OF

NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES UNLESS OTHERWISE NOTED.

131+00 132+00 133+00 134+00 135+00

690 680 670 660

MATCH LINE SHEET 33

MATCH LINE SHEET 35

STA. 131+00

STA. 135+00

STA. 132+00 ℄ MH NO. 3 ②

EX. GROUND

Asbuilt HGL

HGL

Updated HGL

2012 MP HGL

Updated Q100 = 736.9 cfs

MP Q100 = 736.9 cfs

S= 0.00274

PROFILE GRADE ℄ IMP

1672.81

673.91

400' ①
10'W X 10'H RCB

HYDRAULIC DATA
Q_{100} = 720 cfs
V_{100} = 11 fps

EXISTING BELLEGRAVE AVE. R/W

76'

62'

50

21'

55'

15'

RIVERSIDE COUNTY
SAN BERNARDINO COUNTY

℄ 10' X 10' RCB

EX. C/G

EP

2%

EP

EX. GROUND

1

4

16" WATERLINE (FUTURE)

EX. BASIN

PROFILE GRADE

SECTION AT STA. 132+00

FUTURE 10" SEWER LINE (PER CITY OF ONTARIO)

10' 0 10'

EXISTING DITCH

TRACT 28910

FUTURE BELLEGRAVE AVE R/W

EXISTING BELLEGRAVE AVE. R/W

℄ COUNTY LINE CHANNEL

N69° 55' 04"E

B-16

EX. E.P.

EX. E.P.

SAN BERNARDINO COUNTY

RIVERSIDE COUNTY

②③ STA. 132+00
℄ MH NO. 3

℄ BELLEGRAVE AVE.

EXISTING BELLEGRAVE AVE. R/W

TRACT NO 28910

62' 50' 15' 5' 5' 76'

PLAN

N

20' 0 20'

NOTES

① CONSTRUCT 10' X 10' RCB PER CALTRANS STD. D80. TRANSVERSE CONSTRUCTION JOINT PER NOTE 6 ON SHEET 38.

② CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPLACE THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AND COVER PER SBCFC STD. 205.

③ CONSTRUCT MANHOLE APRON PER SBCFC STD. D260.

REGISTERED PROFESSIONAL ENGINEER JIM M. KONG No. 27090 Exp. 3-31-05 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER CLYDE D. JOHNSON No. 30539 Exp. 3-31-04 CIVIL STATE OF CALIFORNIA

1-317-1

BENCH MARK

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

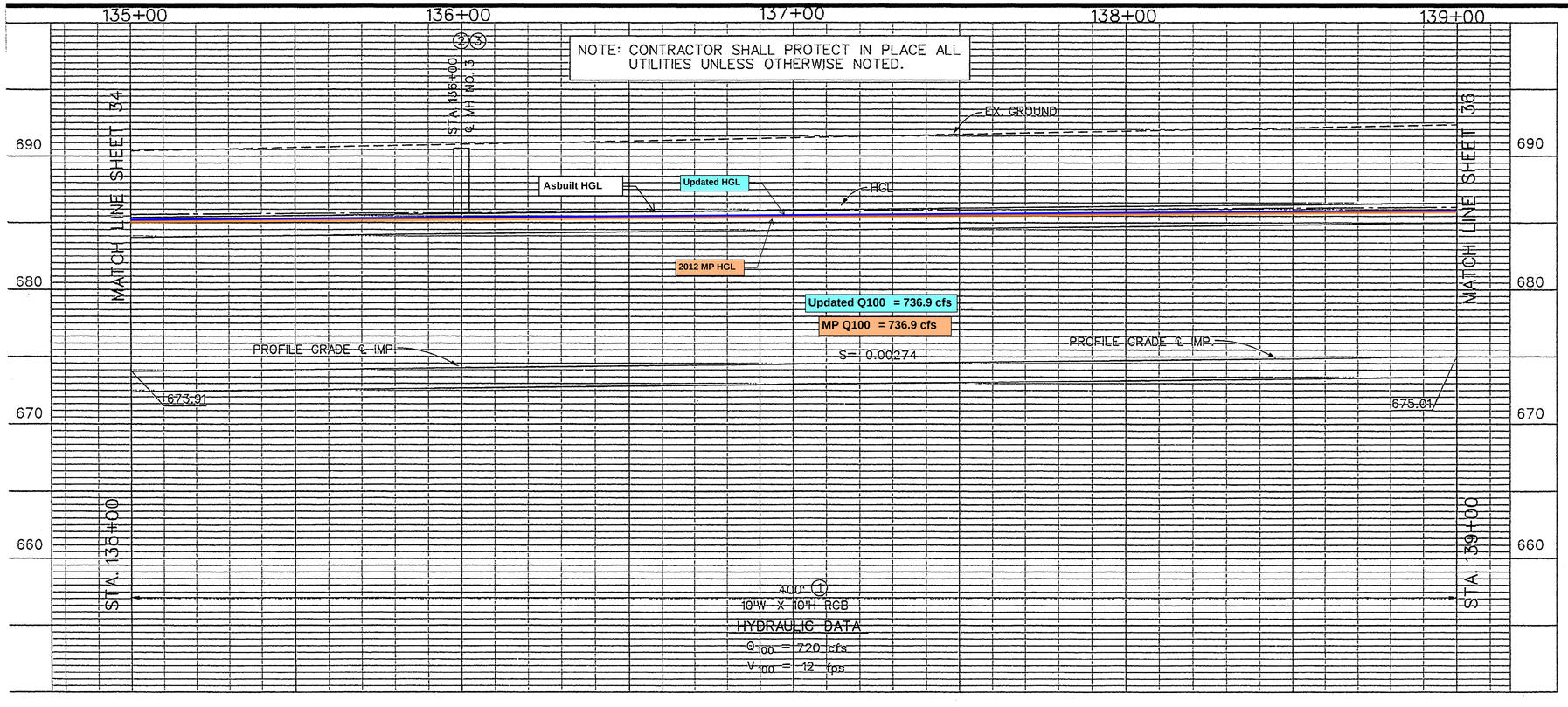
RECOMMENDED FOR APPROVAL BY:
SENIOR CIVIL ENGINEER
DATE: 12/20/03 R.E. No. 27090

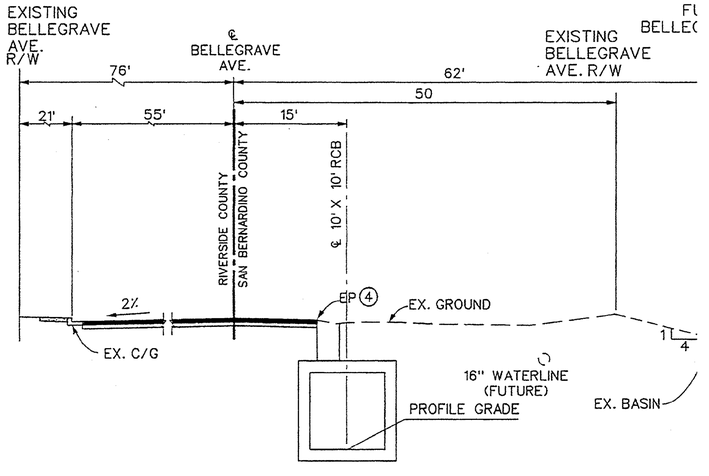
APPROVED BY:
CHIEF, DESIGN & CONSTRUCTION
DATE: 12/30/03 R.E. No. 30539

COUNTY LINE CHANNEL

STA. 131+00 TO STA. 135+00

PROJECT NO. 2-0-0
DRAWING NO. 2-31
SHEET NO. 34 OF

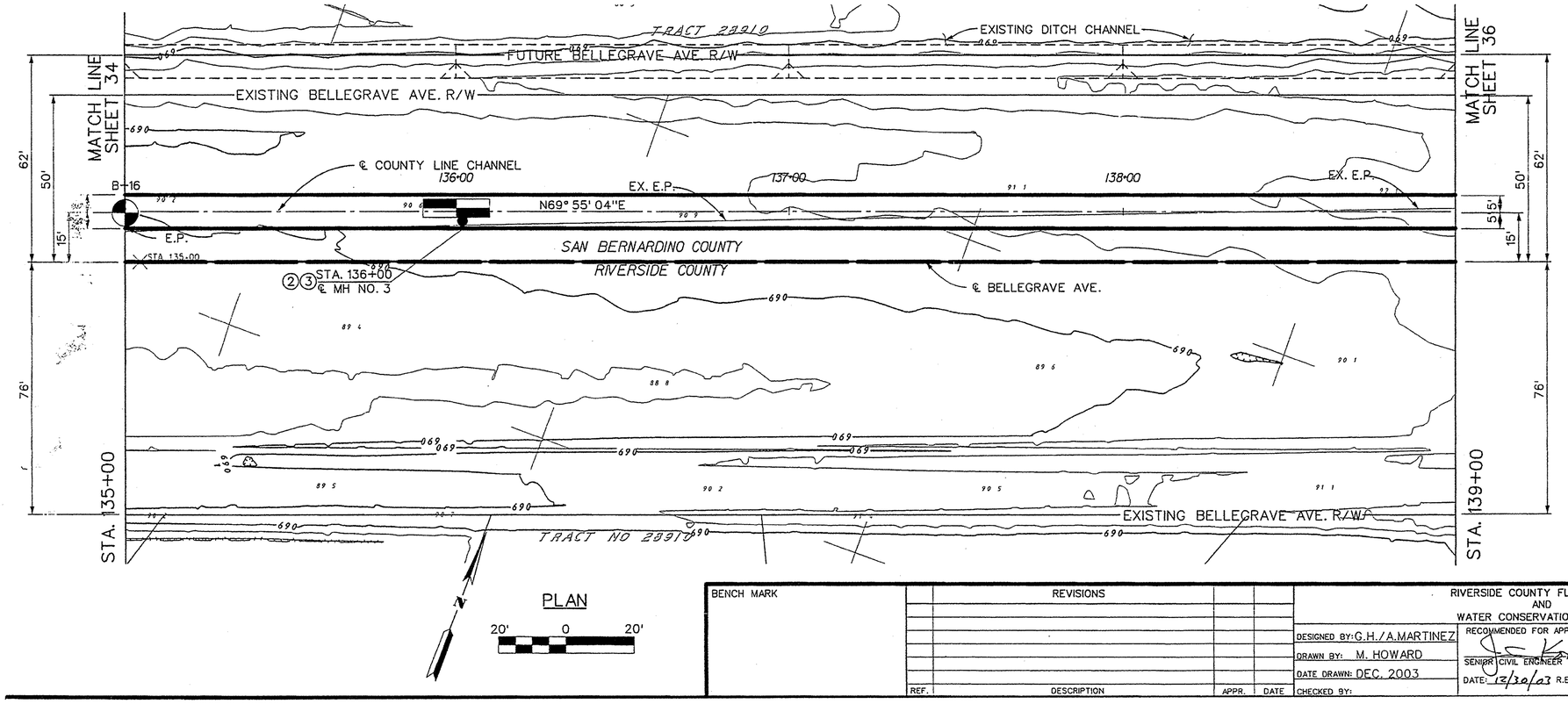




SECTION AT STA. 136+00

FUTURE 10" SEWER LINE (PER CITY OF ONTARIO)

10' 0 10'



PLAN

20' 0 20'

NOTES

① CONSTRUCT 10' X 10' RCB PER CALTRANS STD. D80. TRANSVERSE CONSTRUCTION JOINT PER NOTE 6 ON SHEET 38.

② CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPLACE THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AND COVER PER SBCFC STD. 205.

③ CONSTRUCT MANHOLE APRON PER SBCFC STD. D260.

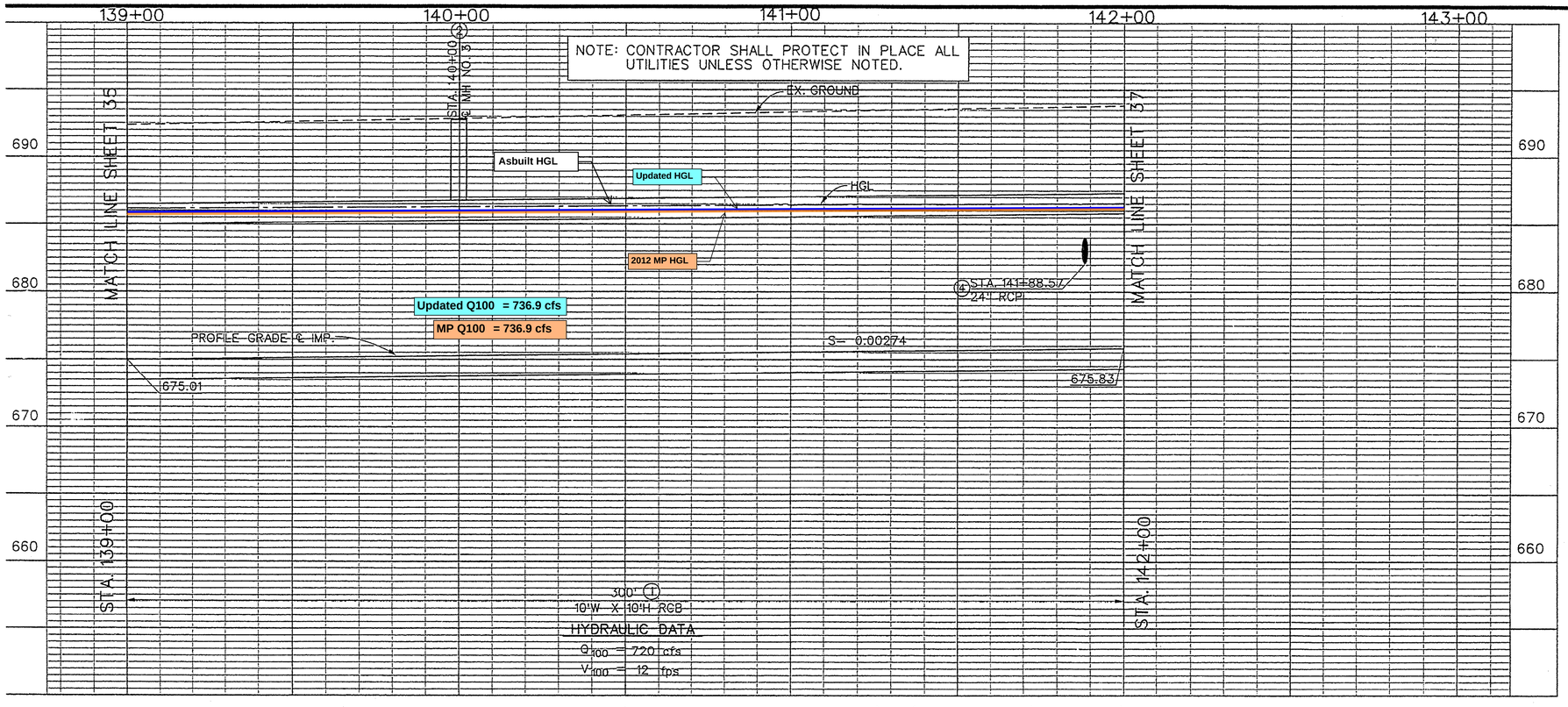
④ EXISTING EDGE OF PAVEMENT NORTH OF THE COUNTY LINE BETWEEN JAMESTOWN AVE. AND HAMNER AVE. VARIES FROM 0' TO 22'. PAVEMENT SHALL BE REPLACED WITH 0.43' TYPE 'B' AC AND 0.75' CLASS 2 AG. BASE WITHIN THE DISTRICT'S PAY LINES. ANY PAVEMENT REMOVED OUTSIDE THE PAY LIMITS SHALL BE REPLACED IN KIND BY THE CONTRACTOR.

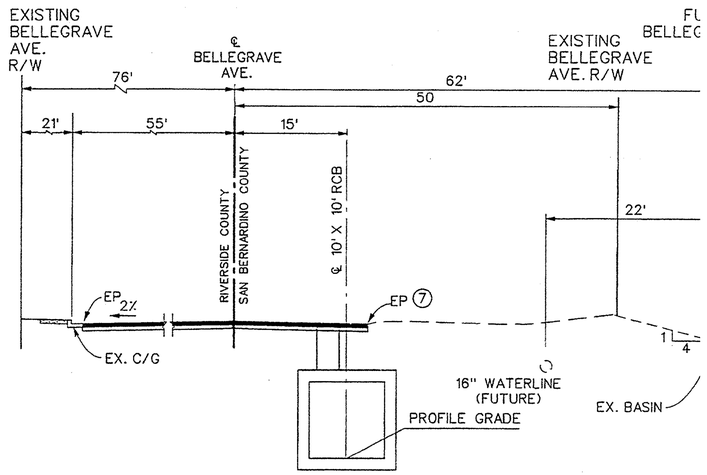
REGISTERED PROFESSIONAL ENGINEER — JIM M. KONG — No. 27090 Exp. 3-31-05 — CIVIL — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — CLYDE D. JOHNSON — No. 30539 Exp. 3-31-04 — CIVIL — STATE OF CALIFORNIA

#1-317-1

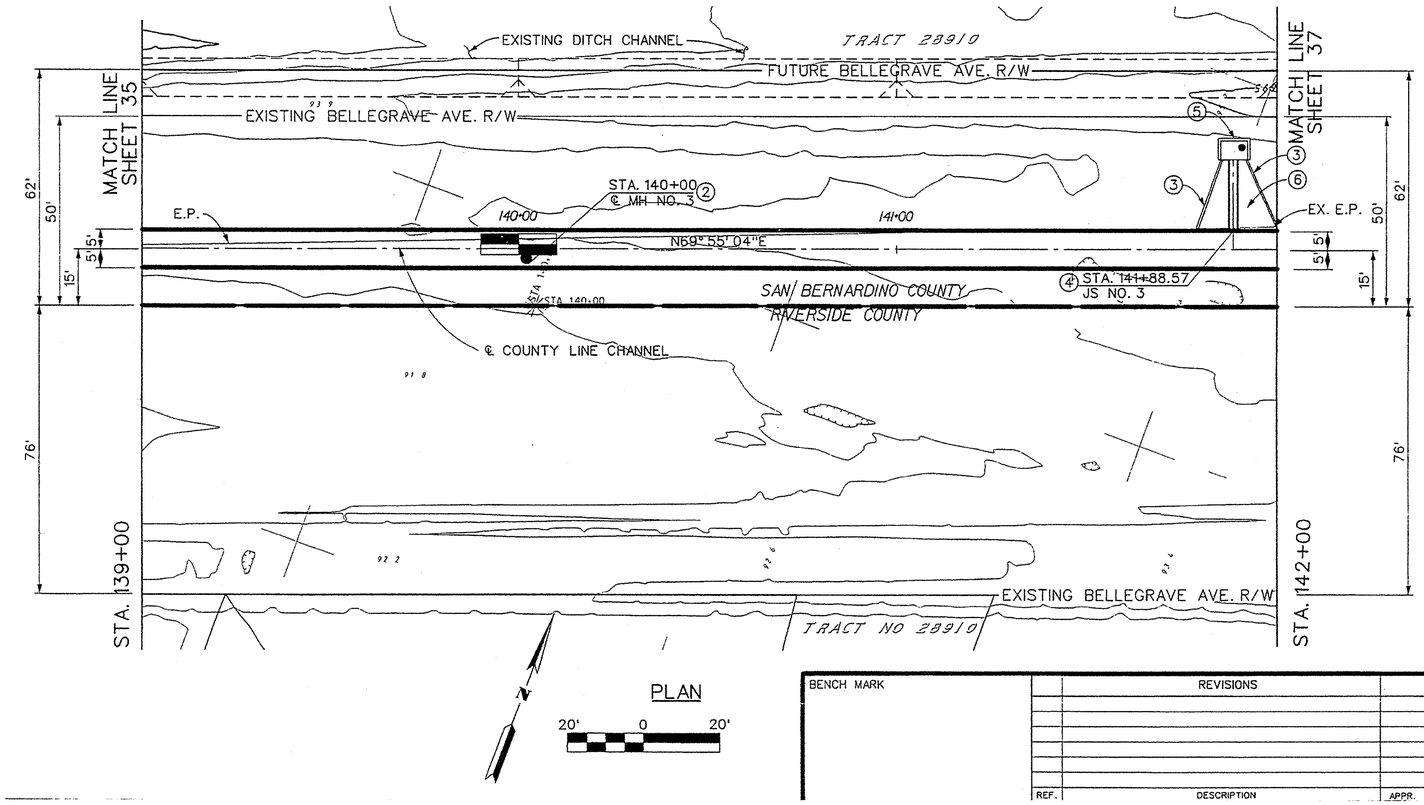
BENCH MARK	REVISIONS			RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT			COUNTY LINE CHANNEL	PROJECT NO. 2-0-0
	REF.	DESCRIPTION	APPR. DATE	DESIGNED BY: G.H./A.MARTINEZ	RECOMMENDED FOR APPROVAL BY:	APPROVED BY:		DRAWING NO. 2-31
				DRAWN BY: M. HOWARD	SENIOR CIVIL ENGINEER	CHIEF, DESIGN & CONSTRUCTION	STA. 135+00 TO STA. 139+00	SHEET NO. 35 OF
				DATE DRAWN: DEC. 2003	DATE: 12/30/03 R.E. No. 27090	DATE: 12/30/03 R.E. No. 30539		
				CHECKED BY:				





SECTION AT STA. 140+00 ? FUTURE 10" SEWER LINE (PER CITY OF ONTARIO)

10' 0 10'



NOTES

1. CONSTRUCT 10' X 10' RCB PER CALTRANS STD. D80. TRANSVERSE CONSTRUCTION JOINT PER NOTE 6 ON SHEET 38.
2. CONSTRUCT MANHOLE NO. 3 PER STD. MH253. MODIFIED TO REPLACE THE REDUCER WITH 3' DIAMETER SHAFT AND WITH MANHOLE FRAME AND COVER PER SBCFC STD. 205.
3. CONSTRUCT AC DIKE PER DETAILS ON SHEET 72.
4. CONSTRUCT JS NO. 3 PER STD. JS228.
5. CONSTRUCT CB NO. 1 PER STD. CB100 W= 7.0', V= 5.0', 11.3' – 24" RCP CL IV. SEE PROFILE ON SHEET 71.
6. CONSTRUCT 3" AC APRON AROUND INLET PER DETAILS ON SHEET 72.
7. EXISTING EDGE OF PAVEMENT NORTH OF THE COUNTY LINE BETWEEN JAMESTOWN AVE. AND HAMNER AVE. VARIES FROM 0' TO 22'. PAVEMENT SHALL BE REPLACED WITH 0.43' TYPE 'B' AC AND 0.75' CLASS 2 AG. BASE WITHIN THE DISTRICT'S PAY LINES. ANY PAVEMENT REMOVED OUTSIDE THE PAY LIMITS SHALL BE REPLACED IN KIND BY THE CONTRACTOR.

REGISTERED PROFESSIONAL ENGINEER — JIM M. KONG — No. 27090 Exp. 3-31-05 — CIVIL — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — CLYDE D. JOHNSON — No. 30539 Exp. 3-31-04 — CIVIL — STATE OF CALIFORNIA

#1-317-1

BENCH MARK

REF.	REVISIONS	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RECOMMENDED FOR APPROVAL BY: SENIOR CIVIL ENGINEER — DATE: 12/20/03 R.E. No. 27090

APPROVED BY: CHIEF, DESIGN & CONSTRUCTION — DATE: 12/20/03 R.E. No. 30539

COUNTY LINE CHANNEL

STA. 139+00 TO STA. 142+00

PROJECT NO. 2-0-0?
DRAWING NO. 2-31?
SHEET NO. 36 OF 1?

142+00 143+00 144+00 145+00 146+00

690 680 670 660

MATCH LINE SHEET 36

STA. 142+00

STA. 142+77

STA. 144+20

END OF PROJECT

℄ HAMNER AVE

EX. GROUND

TV

G4 W8 T G16

W18

HGL

SS21

Asbuilt HGL

Updated HGL

2012 MP HGL

STA 142+77
HGL = 686.35'

60" RCP (FUTURE)
Q_{100} =196 CFS

PROFILE GRADE ℄ IMP.
S= 0.00274

S = 0.00274

675.83

676.04

676.09

676.43

Updated Q100 = 736.9 cfs

MP Q100 = 736.9 cfs

STA 142+77
676.04 inv
Asbuilt HGL = 686.6'
2012 MP HGL=686.25'

NOTE: CONTRACTOR SHALL PROTECT IN PLACE ALL UTILITIES UNLESS OTHERWISE NOTED.

NOT A PART OF THIS CONTRACT

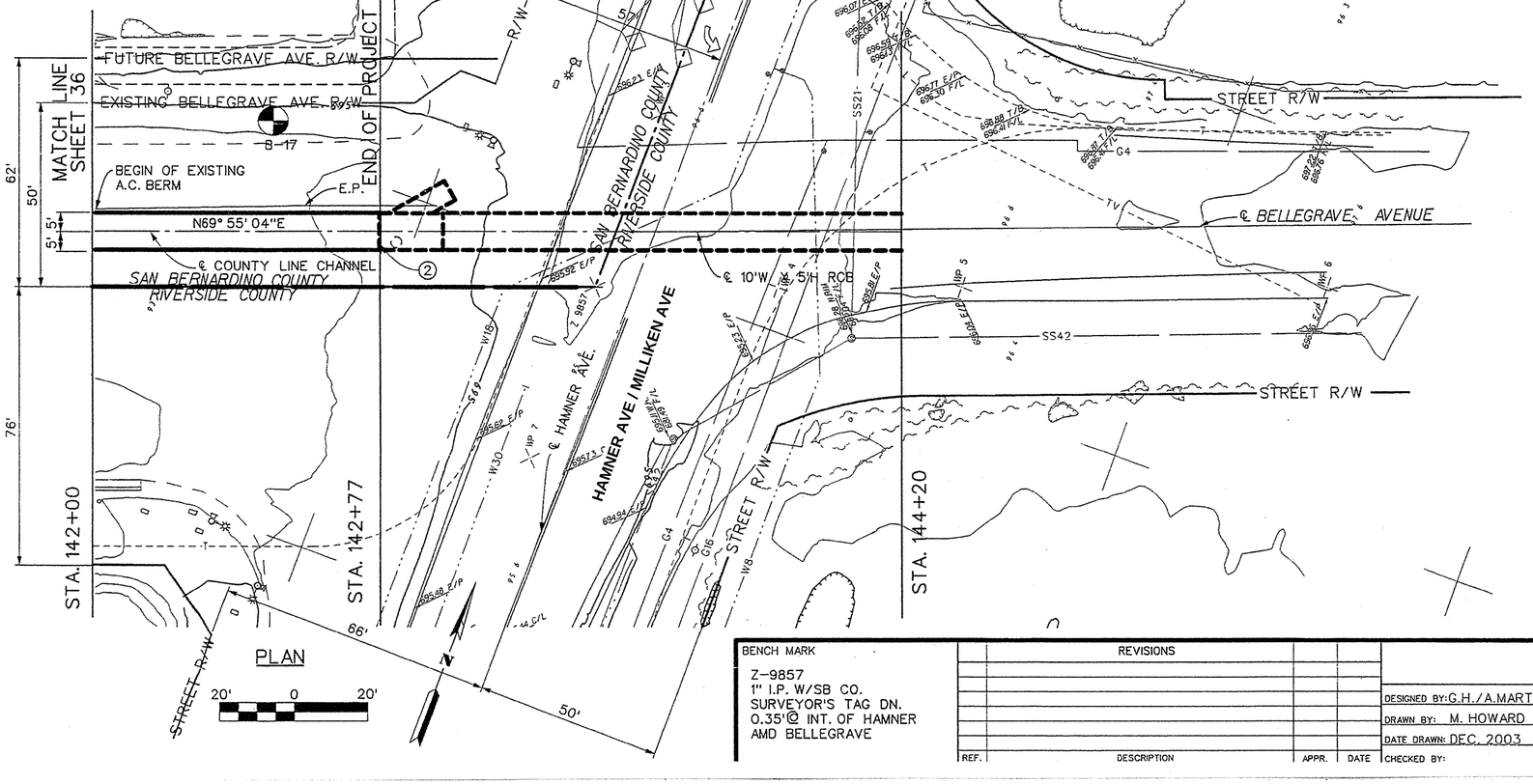
76.88' ①
10'W X 10'H RCB

18'
TRANSITION

10'W X 5'H RCB

HYDRAULIC DATA
Q_{100} = 720 cfs
V_{100} = 12 fps

HYDRAULIC DATA
Q_{100} = 524 cfs
V_{100} = 11 fps



NOTES

① CONSTRUCT 10' X 10' RCB PER CALTRANS STD. D80. TRANSVERSE CONSTRUCTION JOINT PER NOTE 6 ON SHEET 38.

② INSTALL CONCRETE BULKHEAD PER DETAILS ON SHEET 74.

REGISTERED PROFESSIONAL ENGINEER JIM M. KONG No. 27090 Exp. 3-31-05 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER CLYDE D. JOHNSON No. 30539 Exp. 3-31-04 CIVIL STATE OF CALIFORNIA

#1-317-1

BENCH MARK
Z-9857
1" I.P. W/SB CO.
SURVEYOR'S TAG DN.
0.35'℄ INT. OF HAMNER
AMD BELLEGRAVE

REVISIONS			
REF.	DESCRIPTION	APPR.	DATE

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

DESIGNED BY: G.H./A.MARTINEZ
DRAWN BY: M. HOWARD
DATE DRAWN: DEC. 2003
CHECKED BY:

RECOMMENDED FOR APPROVAL BY:
SENIOR CIVIL ENGINEER
DATE: 12/20/03 R.E. No. 27090

APPROVED BY:
CHIEF, DESIGN & CONSTRUCTION
DATE: 12/30/03 R.E. No. 30539

COUNTY LINE CHANNEL

STA. 142+00 TO STA. 142+77

PROJECT NO. 2-0-0
DRAWING NO. 2-31
SHEET NO. 37 OF

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SUBAREA 29

HEADING LINE NO 2 IS -

HAVEN LINE

HEADING LINE NO 3 IS -

2022-04-25

DATE: 3/15/2022
TIME: 14:37

F0515P

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4			8.00														
CD	2	4			7.50														
CD	3	4			3.00														

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1018.47	658.65	1	673.20

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1018.47	658.65	1	0.013	0.00	0.00	0.00	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1129.56	659.22	1	0.013	0.00	0.00	0.00	0

ELEMENT NO 4 IS A JUNCTION * * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1139.56	659.31	1	3	0	0.013	22.6	0.0	659.72	0.00	90.00	0.00

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2100.00	667.78	1	0.013	0.00	0.00	0.00	0

ELEMENT NO 6 IS A JUNCTION * * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	2114.00	667.91	1	3	0	0.013	10.1	0.0	667.78	0.00	90.00	0.00

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2205.40	668.71	1	0.013	0.00	0.00	0.00	0

ELEMENT NO 8 IS A JUNCTION * * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	2217.40	669.32	2	0	0	0.013	0.0	0.0	0.00	0.00	0.00	0.00

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2928.21	675.95	2	0.013	0.00	0.00	0.00	0

ELEMENT NO 10 IS A JUNCTION * * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	2933.71	676.00	2	3	0	0.013	4.3	0.0	679.33	0.00	90.00	0.00

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 11 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	3100.00	677.55	2	0.013	0.00	0.00	0.00	0

ELEMENT NO 12 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	3100.00	677.55	2	677.55

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

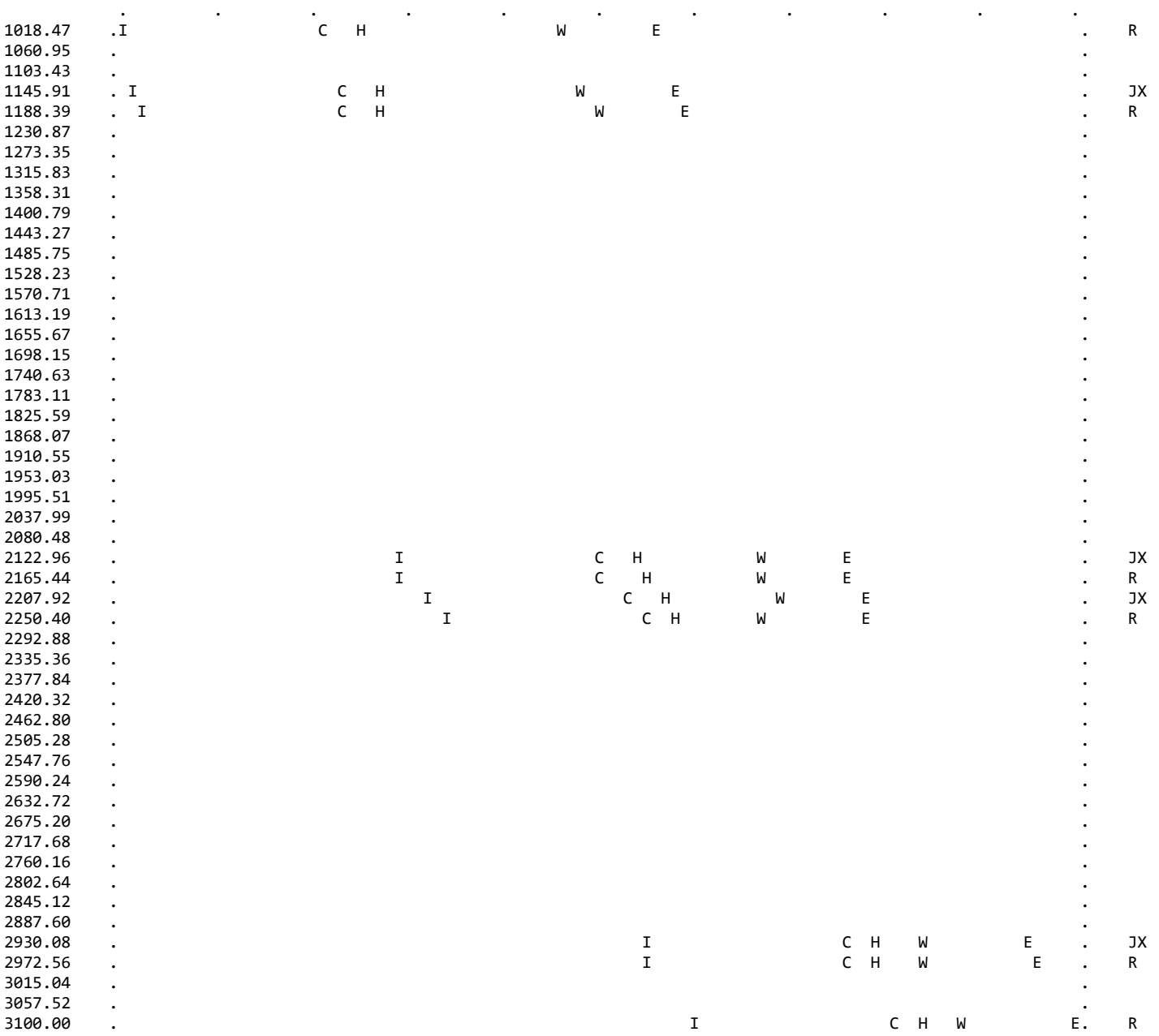
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC

WATER SURFACE PROFILE LISTING

SUBAREA 29
HAVEN LINE
2022-04-25

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
1018.47	658.65	14.550	673.200	700.4	13.93	3.015	676.215	0.00	6.686		8.00	0.00	0.00	0	0.00
111.09	0.00513					.005897	0.66			7.324			0.00		
1129.56	659.22	14.635	673.855	700.4	13.93	3.015	676.870	0.00	6.686		8.00	0.00	0.00	0	0.00
JUNCT STR	0.00900					.005710	0.06						0.00		
1139.56	659.31	14.985	674.295	677.8	13.48	2.823	677.118	0.00	6.592		8.00	0.00	0.00	0	0.00
960.44	0.00882					.005523	5.30			5.370			0.00		
2100.00	667.78	11.819	679.599	677.8	13.48	2.823	682.422	0.00	6.592		8.00	0.00	0.00	0	0.00
JUNCT STR	0.00929					.005441	0.08						0.00		
2114.00	667.91	11.932	679.842	667.7	13.28	2.740	682.582	0.00	6.549		8.00	0.00	0.00	0	0.00
91.40	0.00875					.005359	0.49			5.326			0.00		
2205.40	668.71	11.622	680.332	667.7	13.28	2.740	683.072	0.00	6.549		8.00	0.00	0.00	0	0.00
JUNCT STR	0.05083					.006460	0.08						0.00		
2217.40	669.32	10.286	679.606	667.7	15.11	3.547	683.153	0.00	6.560		7.50	0.00	0.00	0	0.00
710.81	0.00933					.007561	5.37			5.564			0.00		
2928.21	675.95	9.031	684.981	667.7	15.11	3.547	688.528	0.00	6.560		7.50	0.00	0.00	0	0.00
JUNCT STR	0.00909					.007513	0.04						0.00		
2933.71	676.00	9.113	685.113	663.4	15.02	3.501	688.614	0.00	6.544		7.50	0.00	0.00	0	0.00
166.29	0.00932					.007464	1.24			5.536			0.00		
3100.00	677.55	8.804	686.354	663.4	15.02	3.501	689.855	0.00	6.544		7.50	0.00	0.00	0	0.00

SUBAREA 29
HAVEN LINE
2022-04-25



658.65 661.77 664.89 668.01 671.13 674.25 677.37 680.49 683.61 686.73 689.85

N O T E S
1. GLOSSARY
   I = INVERT ELEVATION
   C = CRITICAL DEPTH
   W = WATER SURFACE ELEVATION
   H = HEIGHT OF CHANNEL
   E = ENERGY GRADE LINE
   X = CURVES CROSSING OVER
   B = BRIDGE ENTRANCE OR EXIT
   Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

CITY OF ONTARIO

STORM DRAIN IMPROVEMENT PLANS
HAVEN AVE
FROM BELLEGRAVE AVE TO RIVERSIDE DR

HAVEN AVENUE - SD

PRIVATE ENGINEER'S NOTICE TO CONTRACTOR

1. ALL AVAILABLE RECORDS FROM THE CITY AND UTILITY COMPANIES INVOLVED HAVE BEEN INVESTIGATED AND ALL KNOWN UTILITY CONDUITS AND SUBSTRUCTURES ARE SHOWN HEREON. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL UTILITY CONDUITS AND SUBSTRUCTURES SHOWN OR NOT SHOWN ON THESE PLANS BY 'POT HOLING' PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BEAR THE TOTAL EXPENSE OF REPAIR AND/OR REPLACEMENT OF SAID UTILITY CONDUITS AND SUBSTRUCTURES DAMAGED BY HIS OPERATION IN CONNECTION WITH THE LIMITS OF THIS PROJECT. THE CONTRACTOR IS TO NOTIFY THE ENGINEER OF OR RECORD IMMEDIATELY WITH ANY DISCREPANCIES. COMMENCEMENT OF WORK INDICATES ACCEPTANCE OF ALL EXISTING UTILITIES SHOWN OR NOT SHOW BY THE CONTRACTOR.
2. EXISTING UTILITIES SHALL BE MAINTAINED IN-PLACE BY THE CONTRACTOR, UNLESS OTHERWISE NOTED. RELOCATION OR REMOVAL OF ANY EXISTING UTILITIES NOT COVERED BY THESE PLANS SHALL BE PERFORMED BY OR UNDER THE DIRECTION OF THE RESPECTIVE UTILITY OWNERS AT THE EXPENSE OF THE DEVELOPER.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PRESERVATION OF ALL, IF ANY, EXISTING SURVEY MONUMENTS.
4. THE CONTRACTOR SHALL POSSESS A VALID STATE CONTRACTOR'S LICENSE AND SHALL BE REQUIRED TO POSSESS A VALID CITY BUSINESS LICENSE WHILE PERFORMING WORK ON THIS PROJECT.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS PRIOR TO COMMENCEMENT OF ANY WORK COVERED BY THESE PLANS.
6. THE CONTRACTOR(S) AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO WORKING HOURS.
7. THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE OWNER AND ENGINEER OF RECORD HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPT FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER AND/OR THE ENGINEER OF RECORD.
8. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL DIMENSIONS AND CONDITIONS SHOWN HEREON AT THE JOB SITE PRIOR TO ANY CONSTRUCTION. THE ENGINEER OF RECORD SHALL BE NOTIFIED OF ANY DISCREPANCIES. REVISIONS TO THE PLAN SHALL BE APPROVED BY THE ENGINEER IN WRITING PRIOR TO IMPLEMENTATION.
9. UNAUTHORIZED CHANGES & USES: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

UTILITIES

NOTIFICATION:

CONTRACTOR SHALL CONTACT THE FOLLOWING AGENCIES AND UTILITY COMPANIES AT LEAST TWO WORKING DAYS PRIOR TO STARTING CONSTRUCTION:

UNDERGROUND SERVICE ALERT OF SOUTHERN CALIFORNIA	(800) 227-2600
SOUTHERN CALIFORNIA GAS	(951) 335-3928
TIME WARNER CABLE	(951) 975-3342
INLAND EMPIRE UTILITIES AGENCY	(951) 993-1522
CITY OF ONTARIO	(909) 395-2150
PACIFIC PIPELINE SYSTEM INC.	(526) 728-2351
VERIZON-ENGINEERING DEPARTMENT	(951) 469-6369
SOUTHERN CALIFORNIA EDISON ONTARIO DISTRICT EDISON OPERATOR	(951) 930-8591

BASIS OF BEARINGS

THE BEARINGS SHOWN HEREON ARE BASED ON THE GRID BEARING "NORTH 0°41'49" WEST" BETWEEN HORIZONTAL CONTROL STATIONS "20798" AND "20765" AS PER RECORDS ON FILE WITH THE SAN BERNARDINO COUNTY SURVEYOR.

DATUM STATEMENT

COORDINATES SHOWN HEREON ARE BASED ON THE CALIFORNIA COORDINATE SYSTEM (CCS 83) ZONE V, NAD 83 (1992.60 EPOCH ADJUSTMENT), AS PER RECORDS ON FILE WITH THE SAN BERNARDINO COUNTY SURVEYOR.

UNLESS OTHERWISE NOTED, ALL DISTANCES SHOWN HEREON ARE GROUND. TO OBTAIN GRID DISTANCES, MULTIPLY GROUND DISTANCES BY 0.99997816761.

GENERAL NOTES

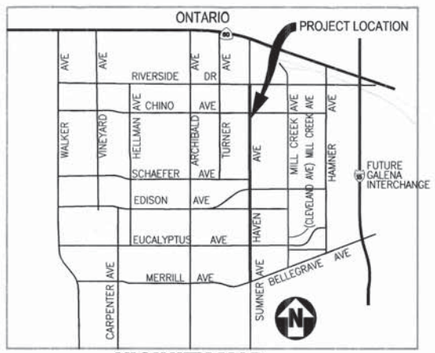
1. ALL WORK SHALL BE DONE IN STRICT CONFORMANCE WITH THE CURRENT CITY OF ONTARIO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS AND CURRENT SPPWC STANDARD SPECIFICATIONS AND STANDARD DRAWINGS UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.
2. ANY CONTRACTOR PERFORMING WORK ON THIS PROJECT SHALL FAMILIARIZE HIMSELF/HERSELF WITH THE SITE AND SHALL BE SOLELY RESPONSIBLE FOR ANY DAMAGE TO EXISTING FACILITIES RESULTING DIRECTLY OR INDIRECTLY FROM HIS/HER OPERATIONS, WHETHER OR NOT THE FACILITY IS SHOWN ON THESE PLANS.
3. ALL OBSTRUCTIONS WITHIN THE AREA TO BE IMPROVED SHALL BE REMOVED AND/OR RELOCATED AT THE DIRECTION OF THE CITY ENGINEER. UTILITIES ARE TO BE RELOCATED BY THEIR RESPECTIVE OWNERS UNLESS NOTED OTHERWISE. THE CONTRACTOR IS REFERRED TO SECTION 5 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
4. UTILITY LINE LOCATIONS WERE TAKEN FROM AVAILABLE RECORD DATA AND WERE NOT LOCATED IN THE FIELD, UNLESS OTHERWISE NOTED ON THE PLAN. THE CONTRACTOR IS REFERRED TO SECTION 5 OF THE STANDARD SPECIFICATIONS.
5. IN CASE OF ANY ACCIDENTS INVOLVING SAFETY MATTERS COVERED BY SECTION 6409(B) OF THE CALIFORNIA LABOR CODE, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE STATE DIVISION OF INDUSTRIAL SAFETY.
6. STATE LAW (SB 3019) REQUIRES THE CONTRACTOR TO CONTACT UNDERGROUND SERVICE ALERT AND OBTAIN AN IDENTIFICATION NUMBER PRIOR TO THE ISSUANCE OF CITY'S ENCROACHMENT PERMIT. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT AT 1-800-227-2600 A MINIMUM OF 48 HOURS IN ADVANCE OF ANY CONSTRUCTION ACTIVITIES.
7. PRIOR TO THE START OF ANY WORK THE CONTRACTOR SHALL OBTAIN A BUSINESS LICENSE FROM THE CITY OF ONTARIO. THE CONTRACTOR SHALL ALSO OBTAIN AN ENCROACHMENT PERMIT FROM THE ENGINEERING DEPARTMENT NO LESS THAN 48 HOURS PRIOR TO START OF ANY CONSTRUCTION WITHIN THE PUBLIC RIGHT-OF-WAY.
8. THE CONTRACTOR SHALL OBTAIN A TRAFFIC CONTROL PERMIT 48 HOURS PRIOR TO TIME OF CONSTRUCTION WITHIN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR IS REFERRED TO SECTION 7-10.3 OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
9. THE CONTRACTOR SHALL RENEW OR REPLACE ANY EXISTING TRAFFIC STRIPING AND/OR PAVEMENT MARKINGS, WHICH DURING HIS OPERATIONS HAVE BEEN EITHER REMOVED OR THE EFFECTIVENESS OF WHICH HAS BEEN REDUCED. RENEWAL OF TRAFFIC STRIPING AND MARKINGS SHALL BE DONE USING REFLECTIVE THERMO-PLASTIC MARKINGS IN CONFORMANCE WITH SECTION 84 & 85 OF THE CALTRANS STANDARD SPECIFICATIONS AND AS DIRECTED BY THE ENGINEER. ALL REGULATORY, WARNING, AND GUIDE SIGNS SHALL HAVE 3M DIAMOND, VIP GRADE SHEETING WITH SERIES 1160 PROTECTIVE OVERLAY FILM.
10. THE LAND SURVEYORS ACT, SECTION 8771 OF THE BUSINESS & PROFESSIONAL CODE, AND SECTIONS 732.5, 1492-5, 1810-5 OF THE STREETS AND HIGHWAY CODE REQUIRE THAT SURVEY MONUMENTS SHALL BE PROTECTED AND PERPETUATED.IT SHALL BE THE RESPONSIBILITY OF THE DEVELOPER OR OTHERS PERFORMING THE CONSTRUCTION WORK TO RETAIN A QUALIFIED REGISTERED CIVIL ENGINEER AND/OR LICENSED LAND SURVEYOR PRIOR TO THE START OF CONSTRUCTION TO LOCATE, REFERENCE AND FILE THE NECESSARY CORNER RECORDS WITH THE COUNTY SURVEYOR'S OFFICE FOR SURVEY CONTROL POINTS/ MONUMENTS THAT EXIST AS SHOWN ON RECORDED TRACT MAPS, PARCEL MAPS, RECORDS OF SURVEYS AND HIGHWAY MAPS, AND MAY BE DISTURBED OR DAMAGED BY THE PROPOSED CONSTRUCTION."
    AFTER THE COMPLETION OF THE PROPOSED CONSTRUCTION, SAID MONUMENTS AND/OR CONTROL SURVEY POINTS SHALL BE RESET TO THE NEW SURFACE IN ACCORDANCE WITH CURRENT PROFESSIONAL LAND SURVEYING PRACTICES. CORNER RECORDS SHALL BE FILED WITH THE COUNTY SURVEYOR FOR ALL THE NEW MONUMENTS SET. THE DEVELOPER SHALL PROVIDE THE CITY WITH A COMPLETED SET OF "AS BUILT", MYLAR
11. DRAWINGS PRIOR TO THE FINAL INSPECTION. A CITY ACCEPTED/APPROVED SET OF PLANS SHALL BE KEPT ON THE JOB SITE AT ALL TIMES.
12. A PRE-CONSTRUCTION MEETING SHALL OCCUR PRIOR TO CONSTRUCTION.
13. ATTENDEES SHALL INCLUDE A CITY REPRESENTATIVE AND THE CONTRACTOR WHO WILL PERFORM THE WORK. "CUT-SHEETS" SHALL BE PROVIDED TO THE CITY AT THIS MEETING FOR ITS REVIEW.
14. CITY ACCEPTANCE OF PLANS DOES NOT RELIEVE THE DEVELOPER FROM RESPONSIBILITY FOR THE CORRECTION OF ERROR AND OMISSION DISCOVERED DURING CONSTRUCTION. UPON REQUEST OF THE CITY INSPECTOR, THE REQUIRED PLAN REVISIONS SHALL BE PROMPTLY SUBMITTED TO THE CITY ENGINEER FOR REVIEW.
15. ANY REQUIRED RIGHT-OF-WAY OR EASEMENT SHALL BE DEDICATED TO AND ACCEPTED BY THE CITY PRIOR TO COMMENCEMENT OF CONSTRUCTION OF THE IMPROVEMENTS WITHIN THE REQUIRED RIGHT-OF-WAY OR EASEMENT.

STORM DRAIN NOTES

16. WHERE UTILITIES NEED TO BE SUPPORTED, SAID SUPPORTS SHALL BE IN ACCORDANCE WITH SPPWC STANDARD 224-1 UNLESS OTHERWISE INDICATED.
17. PRIOR TO STARTING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION OF EXISTING SEWER MAIN(S) AND NOTIFY THE DESIGN ENGINEER OF ANY VARIATION FROM DESIGN.
18. THE PIPE SHOWN HEREON SHALL BE INSTALLED IN ACCORDANCE WITH CASE III BEDDING AS SHOWN ON LACDPW STANDARD 3080-2, UNLESS OTHERWISE SHOWN. "W" VALUE SHALL BE AS SPECIFIED ON LACDPW STANDARD 3080-2 FOR CASE III BEDDING, NOTES 3(a), 3(b), AND 3(c). IF THE "W" VALUE AT THE TOP OF THE PIPE IS EXCEEDED, THE BEDDING SHALL BE MODIFIED AND/OR PIPE OF ADDITIONAL STRENGTH SHALL BE PROVIDED. ALL PROPOSED MODIFICATIONS TO THIS REQUIREMENT SHALL BE APPROVED BY THE CITY ENGINEER.
19. MINIMUM COVER OF STORM DRAIN MAIN SHALL BE 7 FEET FROM THE FINISHED SURFACE PER STANDARD DRAWING 1302-1304.
20. STORM DRAIN MAIN STATIONING IS PER PIPE CENTERLINE.
21. STREET CENTERLINE STATIONING IS PER THE STREET IMPROVEMENT PLANS AND PROVIDED FOR REFERENCE.

ADDITIONAL STORM DRAIN NOTES

22. CONTRACTOR SHALL NOT BACKFILL TRENCH UNTIL THE CITY INSPECTOR HAS OBTAINED AS-BUILT STATIONING ON ALL STRUCTURES.
23. AT COMPLETION OF ALL UTILITIES AND PRIOR TO ACCEPTANCE OF THE WATERLINES AND PRIOR TO PAVING, THE DEVELOPER SHALL HIRE A CITY APPROVED VIDEO COMPANY TO VIDEO TAPE THE PIPELINES. CITY SHALL REVIEW SAID VIDEOTAPES FOR POTENTIAL CONSTRUCTION DEFECTS PRIOR TO ACCEPTANCE OF THE PROJECT.



VICINITY MAP

NTS

LEGEND

- ROADWAY CENTERLINE
- PROPERTY – R/W LINE
- PROPOSED PIPELINE
- 300+00 — PIPELINE CENTERLINE STATION
- — DW — DOMESTIC WATER LINE
- — S — SANITARY SEWER LINE
- — RW — RECYCLED WATER LINE
- — SD — STORM DRAIN LINE
- TELEMETRY PULL BOX/ TERMINAL CABINET
- WATER SERVICE METER
- SEWER OR STORM SEWER MANHOLE
- ISOLATION VALVE
- AIR & VACUUM RELEASE VALVE
- END OF LINE BLOWOFF ASSEMBLY
- LINE DRAIN BLOWOFF ASSEMBLY
- CORROSION TEST STATION
- WATER QUALITY SAMPLING STATION
- FIRE HYDRANT

LIST OF ABBREVIATIONS

∠PT	ANGLE POINT	NTS	NOT TO SCALE
AB	AGGREGATE BASE	OC	ON CENTER
AC	ASPHALTIC CONCRETE	O.C.	ON CURVE
APN	ASSESSORS PARCEL NUMBER	PCC	POINT OF COMPOUND CURVATURE
BC	BEGIN CURVE	PI	POINT OF INTERSECTION
CAB	CRUSHED AGGREGATE BASE	PRC	POINT OF REVERSE CURVATURE
CB	CATCH BASIN	PROP	PROPOSED
℄	CENTERLINE	PRS	PRESSURE REDUCING STATION
C/G	CURB AND GUTTER	PRV	PRESSURE REDUCING VALVE
CONC	CONCRETE	PUE	PUBLIC UTILITY EASEMENT
DW	DOMESTIC WATER	PVI	POINT OF VERTICAL INTERSECTION
DWG	DRAWING	R	RADIUS
EC	END OF CURVE	RCP	REINFORCED CONCRETE PIPE
ESMT	EASEMENT	RET	RETAINING
ECR	END CURB RETURN	RT	RIGHT
ELEV	ELEVATION	RW	RECYCLED WATER
EP	EDGE OF PAVEMENT	R/W	RIGHT OF WAY
FG	FINISH GRADE	SD	STORM DRAIN
FL	FLOWLINE ELEVATION	SF	SQUARE FEET
FS	FINISH SURFACE	SS	SANITARY SEWER
GB	GRADE BREAK	ST	STREET
HORIZ	HORIZONTAL	STA	STATION
INT	INTERSECTION	STD	STANDARD
L	LENGTH	STR	STRUCTURE
LF	LINEAR FEET	TC	TOP OF CURB
LT	LEFT	TCE	TEMPORARY CONSTRUCTION EASEMENT
MAX	MAXIMUM	TELE	TELEPHONE
MH	MANHOLE	TT#	TENTATIVE TRACT NO
MIN	MINIMUM	TYP	TYPICAL
NO.	NUMBER	VZN	VERIZON
		WQ	WATER QUALITY

STORM DRAIN CONSTRUCTION NOTES

ESTIMATED QUANTITIES

(1)	CONSTRUCT 18" RCP (D-LOAD PER PROFILE).	1589	L.F.
(2)	CONSTRUCT 24" RCP (D-LOAD PER PROFILE).	584	L.F.
(3)	CONSTRUCT 36" RCP (D-LOAD PER PROFILE).	221	L.F.
(4)	CONSTRUCT 42" RCP (D-LOAD PER PROFILE).	1055	L.F.
(5)	CONSTRUCT 54" RCP (D-LOAD PER PROFILE).	649	L.F.
(6)	CONSTRUCT 60" RCP (D-LOAD PER PROFILE).	1107	L.F.
(7)	CONSTRUCT 72" RCP (D-LOAD PER PROFILE).	1631	L.F.
(8)	CONSTRUCT 84" RCP (D-LOAD PER PROFILE).	2517	L.F.
(9)	CONSTRUCT 96" RCP (D-LOAD PER PROFILE).	1041	L.F.
(10)	CONSTRUCT BRICK & MORTAR BULKHEAD SEE SHEET 17.	10	EA
(11)	CONSTRUCT WATER QUALITY STRUCTURE (NSBB 11-16-114 WITH MINIMUM 30" MANHOLES).	1	EA
(12)	CONSTRUCT TRANSITION STRUCTURE PIPE TO PIPE PER SPPWC STD. PLAN 340-2.	13	EA
(13)	CONSTRUCT MANHOLE NO. 2 PER CITY OF ONTARIO STD. DWG. 3008.	23	EA
(14)	CONSTRUCT MANHOLE PIPE TO PIPE (LARGE SIDE INLET) PER SPPWC STD. PLAN 322-2.	14	EA
(15)	CATCH BASIN NO. 2 PER CITY OF ONTARIO STD. DWG. 3003 (W PER PLANS)	32	EA
(16)	CONSTRUCT MANHOLE-CONCRETE BOX STORM DRAIN PER SPPWC STD. PLAN 323-2.	3	EA
(18)	CONSTRUCT 48" RCP (D-LOAD PER PROFILE)	1259	L.F.
(19)	CONSTRUCT 78" RCP (D-LOAD PER PROFILE).	669	L.F.
(20)	CONSTRUCT 90" RCP (D-LOAD PER PROFILE).	2442	L.F.
(21)	CONSTRUCT CONCRETE ENCASEMENT PER CITY OF ONTARIO STD. 2102 CASE 4	1	EA
(22)	CONSTRUCT PIPE ANCHORS PER SPPWC STD. PLAN 221-2.	2	EA
(23)	CONSTRUCT CONCRETE ENCASEMENT PER CITY OF ONTARIO STD. 2102 CASE 3	4	EA

SHEET INDEX

DIGALERT — DIAL BEFORE YOU DIG — TWO WORKING DAYS BEFORE YOU DIG — TOLL FREE 1-800-227-2600 — A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

REGISTERED PROFESSIONAL ENGINEER — CHARLES WILBUR LOCKMAN — No. 42485 Exp. 03/31/16 — CIVIL — STATE OF CALIFORNIA

REVISIONS				DESIGNED BY:	
MARK	DATE	BY	APPROVED/RCE No.	DATE:	
				DRAWN BY:	
				DATE:	
				CHECKED BY: HAI	TCO
				DATE: 7/30/14	

CITY OF ONTARIO

RECOMMENDED BY: Raymond Lee 8/7/14
RAYMOND LEE, P.E./ ASSISTANT CITY ENGINEER — DATE

ACCEPTED BY: Louis Abi-Younes 8-12-14
LOUIS ABI-YOUNES, P.E./ CITY ENGINEER — DATE

BENCH MARK No. S.P.S.N 00789 ELEVATION. 785.572

SAN BERNARDINO COUNTY BENCHMARK LOCATED AT THE INTERSECTION OF TURNER & RIVERSIDE AVENUES, 1/4 COR. SEC. 2/11, T2S, R7W. 2" BRASS DISK STAMPED "T2S, R7W, 1/4, S2, S11" "LS 3258" SET FLUSH IN A.C.

NGVD29 / 1990 ADJ.

TTG TAYLOR & GAINES — T M A D — 901 Via Piemonte, Suite 400 Ontario, California 91764 Phone: 909.477.6915 Fax: 909.477.6916 www.ttgcorp.com

CHARLES W. LOCKMAN — 42485 RCE No. — 07/07/2014 DATE

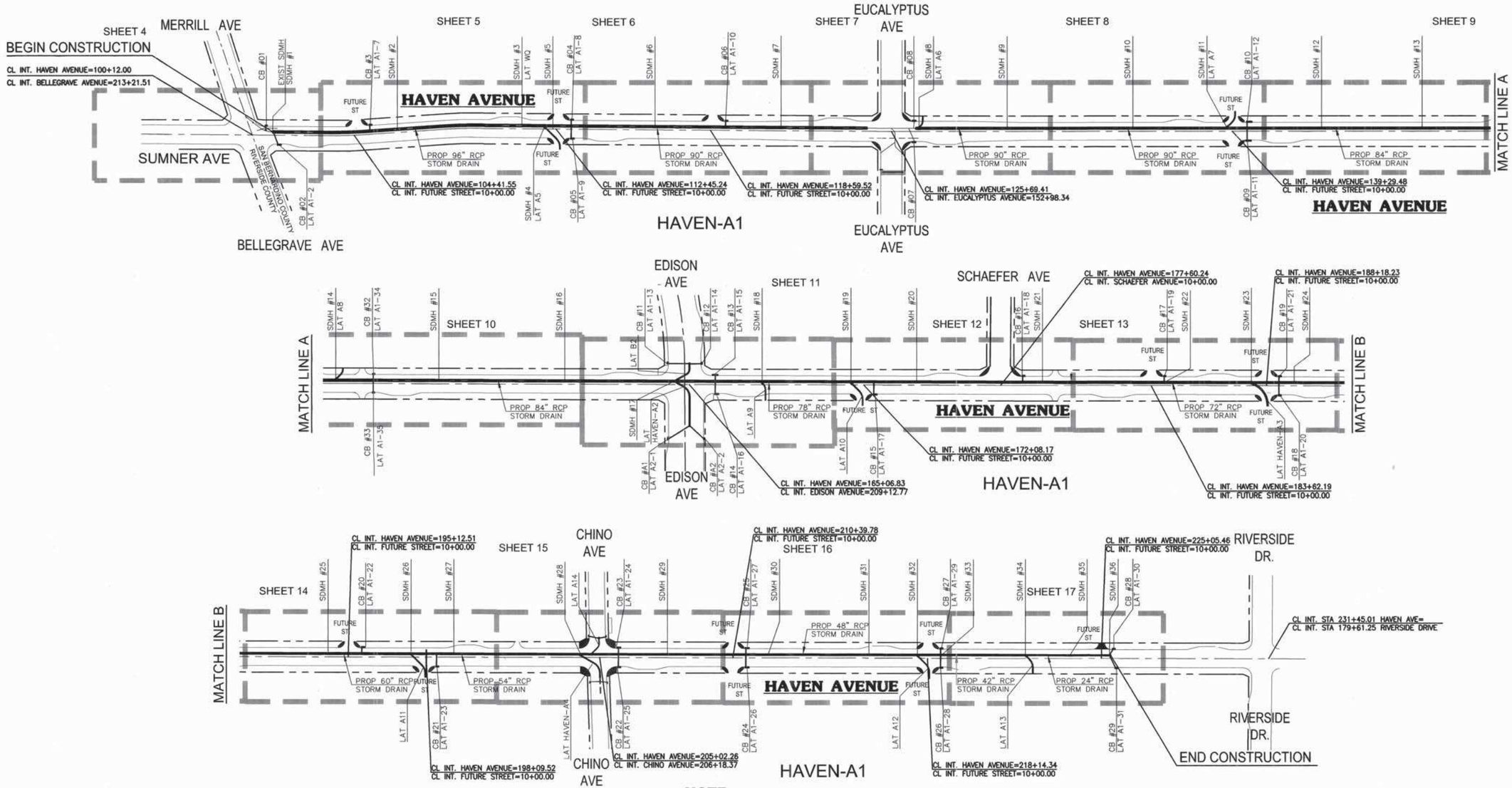
STORM DRAIN IMPROVEMENT PLAN AND PROFILE
HAVEN AVENUE
TITLE SHEET

M-442

SHEET 1 OF 22
CONTRACT
ACCOUNT
DWG. NO. D13601

N:\AUTOCAD\TMAD Projects\2010\2010-011-00\Improvement Plans\Storm Drain\HAVEN\D10011ts01ts.dwg - LAST PLOTTED ON Tue 07/08/14 - 10:47AM BY pshu

SHEET INDEX MAP



NOTE:

THE NAMES OF THE STORM DRAIN SYSTEM SHOWN ON THESE PLANS ARE BASED ON THE CITY OF ONTARIO MASTER PLAN OF DRAINAGE (DATED 2010). THE CITY'S MASTER PLAN OF DRAINAGE (MPD) FOR NEW MODEL COLONY (DATED MARCH, 2012) REVISED THE STORM DRAIN (SD) LINE NAMES.
THE TABLE BELOW SHOWS THE PREVIOUS NAME CONVENTION (SHOWN ON THESE PLANS), AND THE CORRESPONDING NAMES PER THE 2012 MPD.

STORM DRAIN LINE NAME TABLE:

LINE NAME:	2010 MPD	2012 MPD
HAVEN AVENUE MAIN LINE	HAVEN-A1	HAVN-X-1
LATERAL AT EDISON AVE.	LAT HAVEN-A2	HAVN-X-2
LATERAL AT S.D. STA. 97+79	LAT HAVEN-A3	HAVN-X-3
LATERAL AT CHINO AVE.	LAT HAVEN-A4	HAVN-X-4

GRAPHIC SCALE
200 0 100 200 400 800
(IN FEET)
1 inch = 200 ft.

DIGALERT
DIAL BEFORE YOU DIG
TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

REGISTERED PROFESSIONAL ENGINEER CHARLES WILBUR LOCKMAN No. 42485 Exp. 03/31/16 CIVIL STATE OF CALIFORNIA

REVISIONS			
MARK	DATE	BY	APPROVED/RCE No.

DESIGNED BY:
DATE:
DRAWN BY:
DATE:
CHECKED BY: HLN WO
DATE: 7/30/14

CITY OF ONTARIO

RECOMMENDED BY: Raymond Lee 8/7/14
RAYMOND LEE, P.E./ ASSISTANT CITY ENGINEER DATE
ACCEPTED BY: 8-12-16
LOUIS ABI-YOUNES, P.E./ CITY ENGINEER DATE

BENCH MARK No. S.P.S.N 00789 ELEVATION 785.572
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NGVD29 / 1990 ADJ.

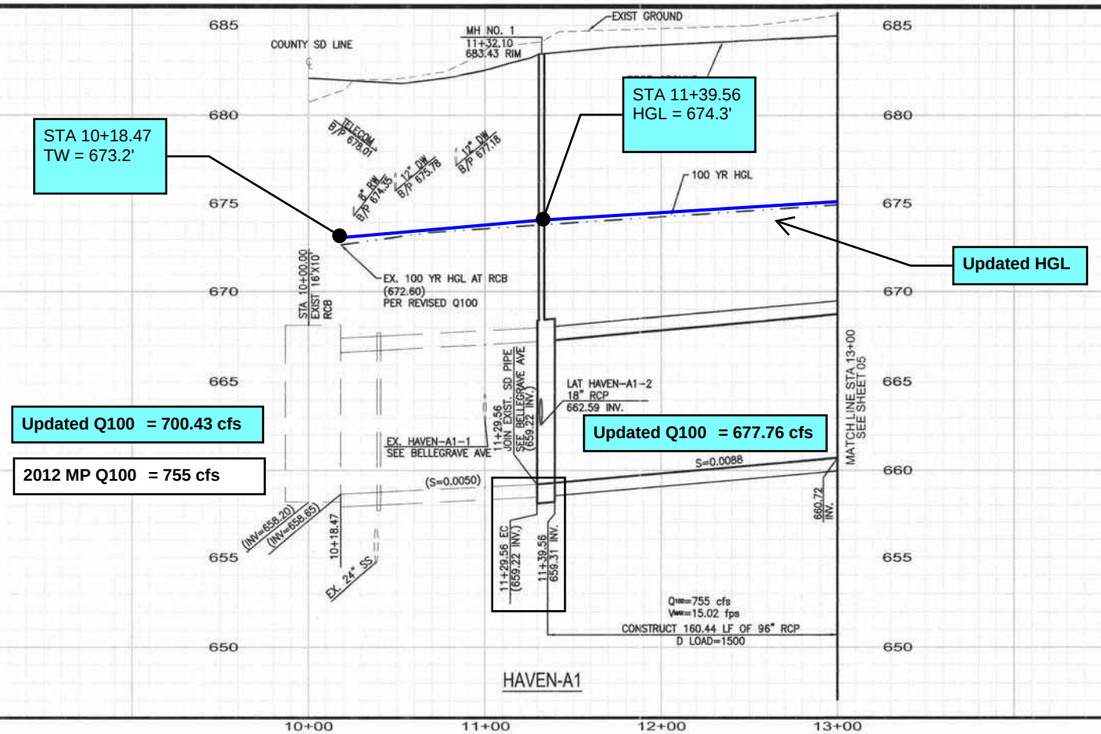
TMAD TAYLOR & GAINES
901 Via Piemonte, Suite 400
Ontario, California 91764
Phone: 909.477.6915 Fax: 909.477.6916
www.ttgcorp.com
CHARLES W. LOCKMAN 42485 07/07/2014
RCE No. DATE

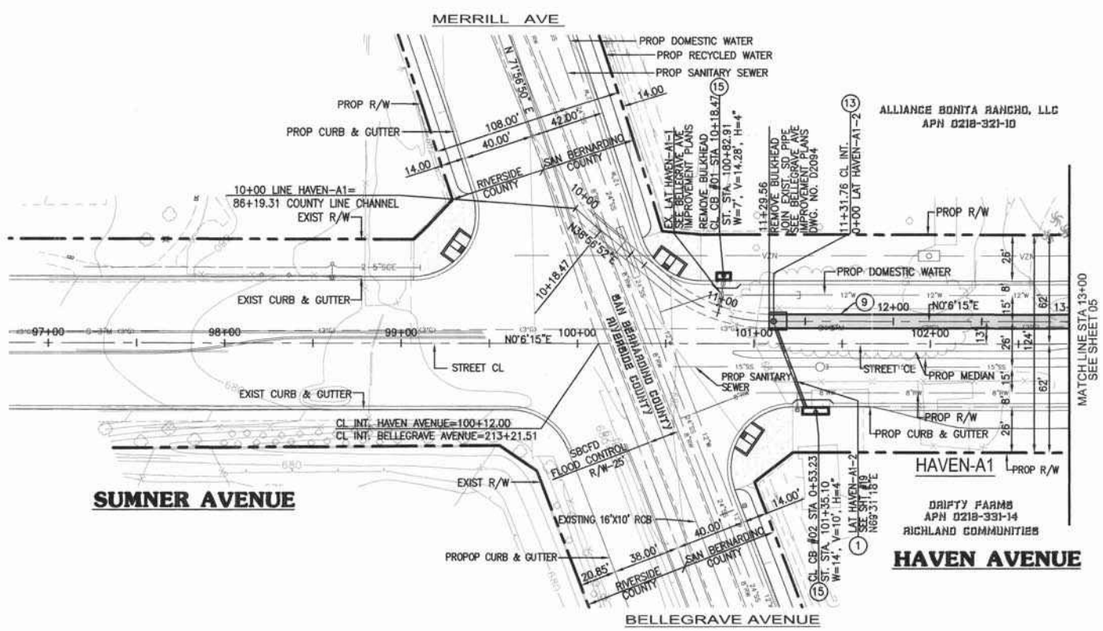
STORM DRAIN IMPROVEMENT PLAN AND PROFILE
HAVEN AVENUE
SHEET INDEX MAP

M-442

SHEET 3 OF 22
CONTRACT
ACCOUNT
DWG. NO. D13603

N:\60.CAD\TMO Projects\20110.60\10-011-00\Improvement Plans\Storm Drain\HAVEN\01100113s003.dwg – LAST PLOTTED ON Tue 07/08/14 – 10:47AM BY pahu





STORM DRAIN CONSTRUCTION NOTES

(1) — CONSTRUCT 18" RCP (D-LOAD PER PROFILE).
(9) — CONSTRUCT 96" RCP (D-LOAD PER PROFILE).
(13) — CONSTRUCT MANHOLE NO. 2 PER CITY OF ONTARIO STD. DWG. 3008.
(15) — CATCH BASIN NO. 2 PER CITY OF ONTARIO STD. DWG. 3003 (W PER PLANS)

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

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REGISTERED PROFESSIONAL ENGINEER — CHARLES WILBUR LOCKMAN — No. 42485 Exp. 03/31/16 — CIVIL — STATE OF CALIFORNIA

REVISIONS			
MARK	DATE	BY	APPROVED/RCE No.

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NGVD29 / 1990 ADJ.

TMAD TAYLOR & GAINES
901 Via Piemonte, Suite 400
Ontario, California 91764
Phone: 909.477.6915 Fax: 909.477.6916
www.ttgcorp.com
CHARLES W. LOCKMAN — 42485 RCE No. — 07/07/2014 DATE

STORM DRAIN IMPROVEMENT PLAN & PROFILE

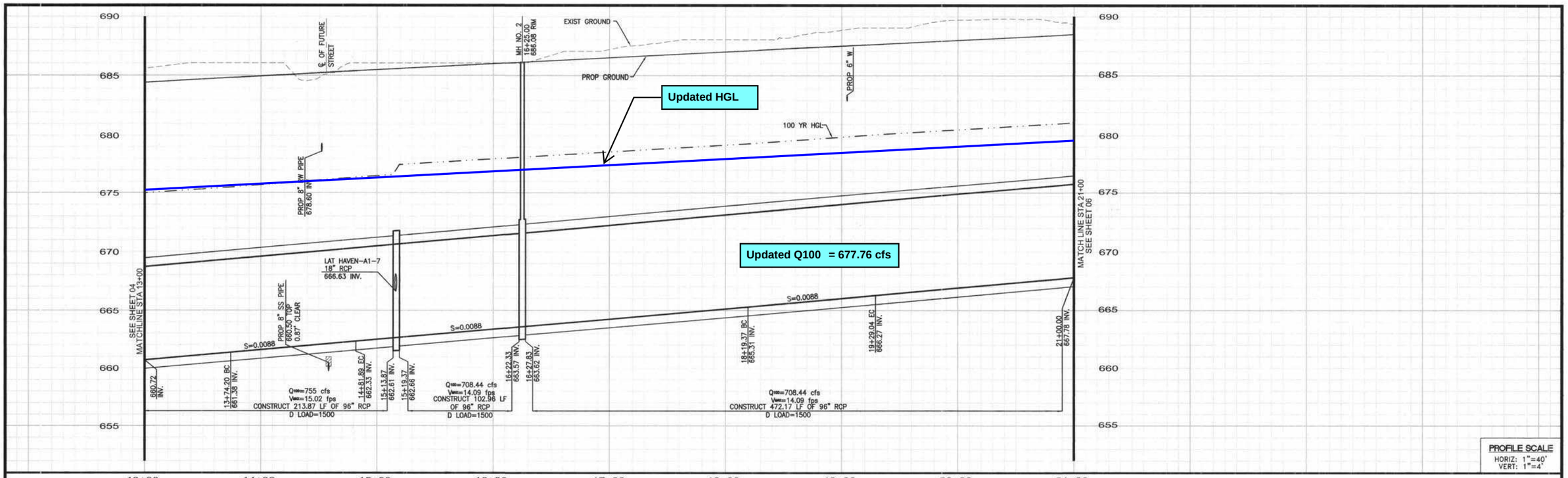
HAVEN AVENUE (LINE A-1)

FROM BELLEGRAVE AVE TO 270' ± N/O BELLEGRAVE AVE

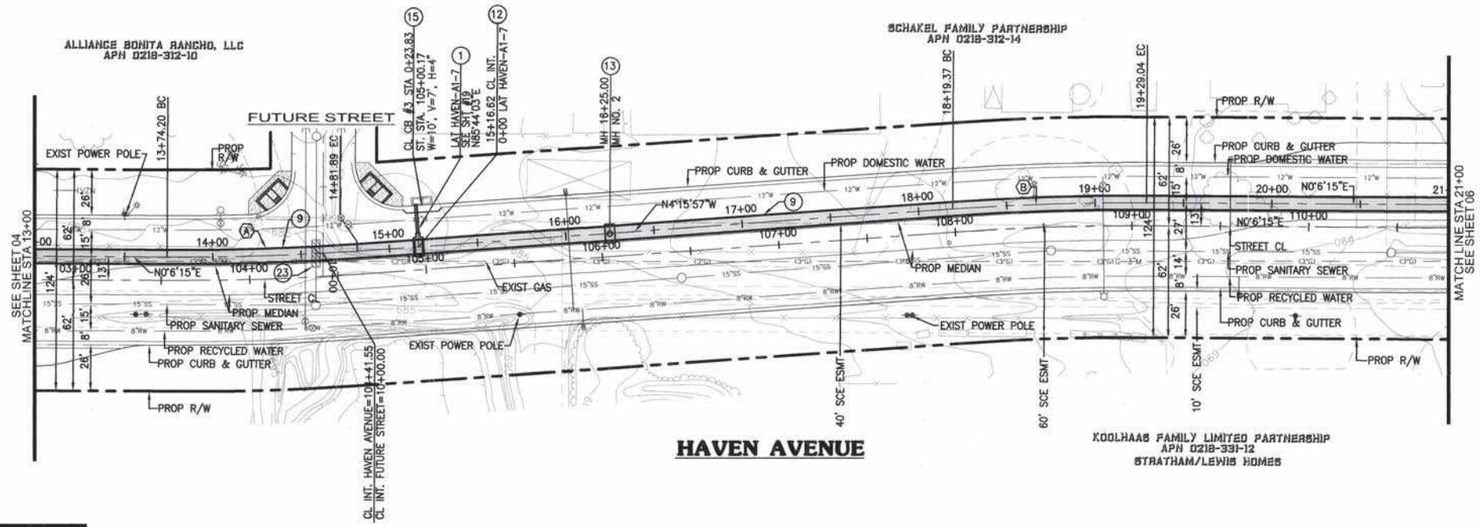
M-442

SHEET 4 OF 22
CONTRACT
ACCOUNT
DWG. NO. D13604

N:\80\040\NMD Projects\2010\6010-011-00\Improvement Plans\Storm Drain\HAVEN\010011ed04sp.dwg – LAST PLOTTED ON Tue 07/08/14 - 10:48AM BY pshu



PROFILE SCALE
HORIZ: 1"=40'
VERT: 1"=4'



STORM DRAIN CONSTRUCTION NOTES

(1) CONSTRUCT 18" RCP (D-LOAD PER PROFILE).
(9) CONSTRUCT 96" RCP (D-LOAD PER PROFILE).
(12) CONSTRUCT TRANSITION STRUCTURE PIPE TO PIPE PER SPPWC STD. PLAN 340-2.
(13) CONSTRUCT MANHOLE NO. 2 PER CITY OF ONTARIO STD. DWG. 3008.
(15) CATCH BASIN NO. 2 PER CITY OF ONTARIO STD. DWG. 3003 (W PER PLANS)
(23) CONSTRUCT CONCRETE ENCASEMENT PER CITY OF ONTARIO STD. 2102 CASE 3

CURVE DATA

	DELTA	RADIUS	LENGTH	TANGENT
(A)	4°22'12"	1412.00'	107.69'	53.87'
(B)	4°22'12"	1438.00'	109.68'	54.87'

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

DIGALERT
DIAL BEFORE YOU DIG — TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

REGISTERED PROFESSIONAL ENGINEER CHARLES WILBUR LOCKMAN No. 42485 Exp. 03/31/16 CIVIL STATE OF CALIFORNIA

REVISIONS			
MARK	DATE	BY	APPROVED/RCE No.

DESIGNED BY:
DATE:
DRAWN BY:
DATE:
CHECKED BY: HN LO
DATE: 7/30/14

CITY OF ONTARIO
RECOMMENDED BY: Raymond Lee 8/7/14
RAYMOND LEE, P.E./ ASSISTANT CITY ENGINEER DATE
ACCEPTED BY: Louis Abi-Younes 8-12-14
LOUIS ABI-YOUNES, P.E./ CITY ENGINEER DATE

BENCH MARK No. S.P.S.N 00789 ELEVATION. 785.572
SAN BERNARDINO COUNTY BENCHMARK LOCATED AT THE INTERSECTION OF TURNER & RIVERSIDE AVENUES, 1/4 COR. SEC. 2/11, T2S, R7W. 2" BRASS DISK STAMPED "T2S, R7W, 1/4, S2, S11" "LS 3258" SET FLUSH IN A.C.
NGVD29 / 1990 ADJ.

TAYLOR & GAINES
TMAD
901 Via Piemonte, Suite 400
Ontario, California 91764
Phone: 909.477.6915 Fax: 909.477.6916
www.ttgcorp.com
CHARLES W. LOCKMAN 42485 RCE No: 07/07/2014 DATE

STORM DRAIN IMPROVEMENT PLAN & PROFILE
HAVEN AVENUE (HAVEN-A1)
FROM 270' ± N/O BELLEGRAVE AVE TO 1,070' ± N/O BELLEGRAVE AVE

M-442

SHEET 5 OF 22
CONTRACT
ACCOUNT
DWG. NO. D13605

N:\ES\CAD\TMAD Projects\2010\6010-011-001\Improvement Plans\Storm Drain\HAVEN\010011sd05pp.dwg - LAST PLOTTED ON Tue 07/08/14 - 10:48AM BY pshu

STA 21+14
HGL = 679.84'

STA 21+00
HGL = 679.6'

STA 22+05.40
HGL = 680.33'

STA 22+17.40
HGL = 679.61'

Updated HGL

STA 29+33.71
HGL = 685.11'

STA 31+00
HGL = 686.35'

Updated Q100 = 667.69 cfs

Updated Q100 = 667.69 cfs

Updated Q100 = 663.36 cfs

2012 MP Q100 = 663.36 cfs

PROFILE SCALE
HORIZ: 1"=40'
VERT: 1"=4'

STORM DRAIN CONSTRUCTION NOTES

1. CONSTRUCT 18" RCP (D-LOAD PER PROFILE).
4. CONSTRUCT 42" RCP (D-LOAD PER PROFILE).
6. CONSTRUCT 60" RCP (D-LOAD PER PROFILE).
9. CONSTRUCT 96" RCP (D-LOAD PER PROFILE).
10. CONSTRUCT BRICK & MORTAR BULKHEAD SEE SHEET 17.
11. CONSTRUCT WATER QUALITY STRUCTURE (NSBB 11-16-114 WITH MINIMUM 30" MANHOLES).
12. CONSTRUCT TRANSITION STRUCTURE PIPE TO PIPE PER SPPWC STD. PLAN 340-2.
13. CONSTRUCT MANHOLE NO. 2 PER CITY OF ONTARIO STD. DWG. 3008.
14. CONSTRUCT MANHOLE PIPE TO PIPE (LARGE SIDE INLET) PER SPPWC STD. PLAN 322-2.
15. CATCH BASIN NO. 2 PER CITY OF ONTARIO STD. DWG. 3003 (W PER PLANS)
16. CONSTRUCT MANHOLE-CONCRETE BOX STORM DRAIN PER SPPWC STD. PLAN 323-2.
20. CONSTRUCT 90° RCP (D-LOAD PER PROFILE).
23. CONSTRUCT CONCRETE ENCASEMENT PER CITY OF ONTARIO STD. 2102 CASE 3

CURVE DATA

	DELTA	RADIUS	LENGTH	TANGENT
(C)	44°05'21"	45.00'	35.41'	18.68'
(D)	44°58'57"	45.00'	35.33'	18.63'
(E)	44°58'57"	45.00'	35.33'	18.63'

GRAPHIC SCALE
40 0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

DIGALERT
DIAL BEFORE YOU DIG — TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

REGISTERED PROFESSIONAL ENGINEER CHARLES WILBUR LOCKMAN No. 42485 Exp. 03/31/16 CIVIL STATE OF CALIFORNIA

REVISIONS			
MARK	DATE	BY	APPROVED/RCE No.

DESIGNED BY:
DATE:
DRAWN BY:
DATE:
CHECKED BY: HN KD
DATE: 7/30/14

CITY OF ONTARIO

RECOMMENDED BY: Raymond Lee 8/7/14
RAYMOND LEE, P.E./ ASSISTANT CITY ENGINEER DATE
ACCEPTED BY: 8.12.14
LOUIS ABI-YOUNES, P.E./ CITY ENGINEER DATE

BENCH MARK No. S.P.S.N 00789 ELEVATION. 785.572
SAN BERNARDINO COUNTY BENCHMARK LOCATED AT THE INTERSECTION OF TURNER & RIVERSIDE AVENUES, 1/4 COR. SEC. 2/11, T2S, R7W. 2" BRASS DISK STAMPED "T2S, R7W, 1/4, S2, S11" "LS 3258" SET FLUSH IN A.C.
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CHARLES W. LOCKMAN 42485 RCE No. 07/07/2014 DATE

STORM DRAIN IMPROVEMENT PLAN & PROFILE

HAVEN AVENUE (HAVEN-A1)

FROM 1,070' ± N/O BELLEGRAVE AVE TO 2,070' ± N/O BELLEGRAVE AVE

M-442

SHEET 6 OF 22
CONTRACT
ACCOUNT
DWG. NO. D13606

N:\80.CAD\TMAD Projects\2010\6010-011-00\Improvement Plans\Storm Drain\HAVEN\010011st06pp.dwg - LAST PLOTTED ON Tue 07/08/14 - 10:49AM BY pshu

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

SUBAREA 29

HEADING LINE NO 2 IS -

MILL CREEK LINE

HEADING LINE NO 3 IS -

2022-04-25

DATE: 3/15/2022
TIME: 14:49

F0515P

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING PAGE 1

CARD CODE	SECT NO	CHN TYPE	NO OF PIERS	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4			9.00														
CD	2	3	0	0.00	10.00	13.00	0.00	0.00	0.00										
CD	3	3	0	0.00	10.00	8.00	0.00	0.00	0.00										
CD	4	4			3.00														

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	992.84	667.23	3	681.50

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	992.84	667.23	3	0.014	0.00	0.00	0.00	0

ELEMENT NO 3 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1495.00	668.76	3	0.014	0.00	0.00	0.00	0

ELEMENT NO 4 IS A JUNCTION * * * * * * *

U/S DATA	STATION	INVERT	SECT	LAT-1	LAT-2	N	Q3	Q4	INVERT-3	INVERT-4	PHI 3	PHI 4
	1500.00	668.78	3	4	0	0.014	27.0	0.0	669.70	0.00	30.00	0.00

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2351.00	671.44	3	0.014	0.00	0.00	0.00	0

ELEMENT NO 6 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N
	2401.00	671.61	2	0.014

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2421.00	671.95	2	0.014	0.00	0.00	0.00	0

ELEMENT NO 8 IS A TRANSITION * * *

U/S DATA	STATION	INVERT	SECT	N
	2471.67	676.62	1	0.013

ELEMENT NO 9 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	2479.67	676.69	1	0.013	0.00	0.00	0.00	0

ELEMENT NO 10 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	2479.67	676.69	1	0.00

NO EDIT ERRORS ENCOUNTERED-COMPUTATION IS NOW BEGINNING

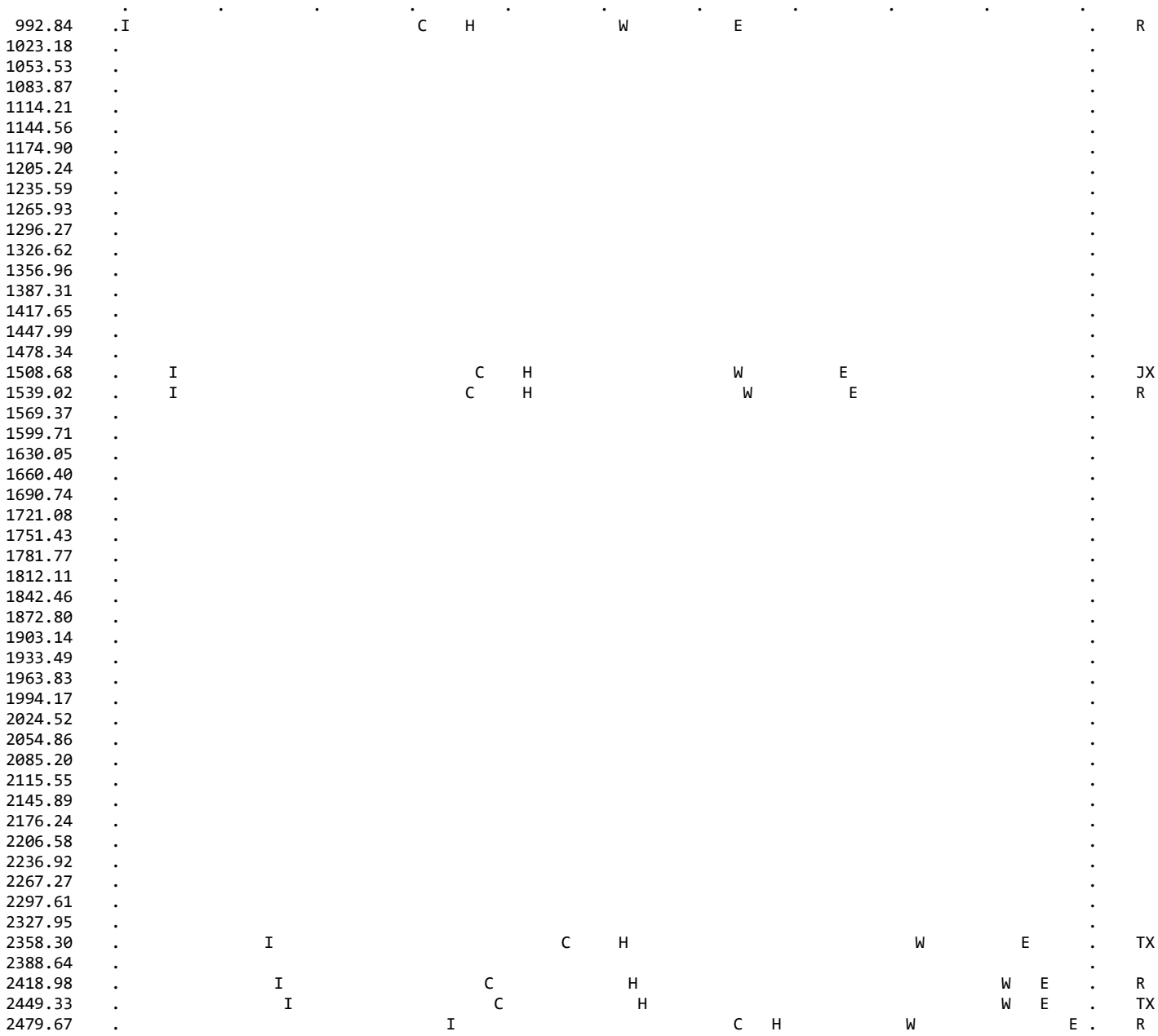
** WARNING NO. 2 ** - WATER SURFACE ELEVATION GIVEN IS LESS THAN OR EQUALS INVERT ELEVATION IN HDWKDS, W.S.ELEV = INV + DC

WATER SURFACE PROFILE LISTING

SUBAREA 29
MILL CREEK LINE
2022-04-25

STATION	INVERT ELEV	DEPTH OF FLOW	W.S. ELEV	Q	VEL	VEL HEAD	ENERGY GRD.EL.	SUPER ELEV	CRITICAL DEPTH		HGT/ DIA	BASE/ ID NO.	ZL	NO PIER	AVBPR
L/ELEM	SO					SF AVE	HF			NORM DEPTH			ZR		
992.84	667.23	14.270	681.500	1129.9	14.17	3.117	684.617	0.00	8.527		10.00	8.00	0.00	0	0.00
502.16	0.00305					.006170	3.10			10.000			0.00		
1495.00	668.76	15.838	684.598	1129.9	14.17	3.117	687.715	0.00	8.527		10.00	8.00	0.00	0	0.00
JUNCT STR	0.00400					.006024	0.03						0.00		
1500.00	668.78	16.108	684.888	1102.9	13.83	2.970	687.858	0.00	8.391		10.00	8.00	0.00	0	0.00
851.00	0.00313					.005878	5.00			10.000			0.00		
2351.00	671.44	18.450	689.890	1102.9	13.83	2.970	692.860	0.00	8.391		10.00	8.00	0.00	0	0.00
TRANS STR	0.00340					.003744	0.19						0.00		
2401.00	671.61	20.500	692.110	1102.9	8.50	1.122	693.232	0.00	6.071		10.00	13.00	0.00	0	0.00
20.00	0.01700					.001609	0.03			3.531			0.00		
2421.00	671.95	20.192	692.142	1102.9	8.50	1.122	693.264	0.00	6.071		10.00	13.00	0.00	0	0.00
TRANS STR	0.09217					.004595	0.23						0.00		
2471.67	676.62	12.919	689.539	1102.9	17.34	4.667	694.206	0.00	8.003		9.00	0.00	0.00	0	0.00
8.00	0.00875					.007802	0.06			6.963			0.00		
2479.67	676.69	12.912	689.602	1102.9	17.34	4.667	694.269	0.00	8.003		9.00	0.00	0.00	0	0.00

SUBAREA 29
MILL CREEK LINE
2022-04-25



.	.	.	.	.	.	.	.	.	.	.
667.23	669.93	672.64	675.34	678.05	680.75	683.45	686.16	688.86	691.57	694.27

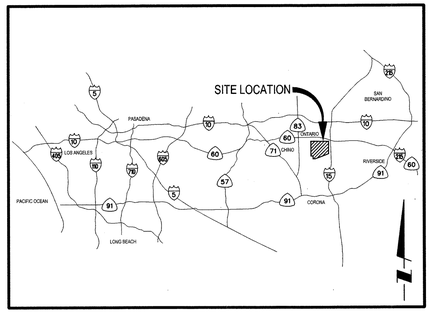
N O T E S

1. GLOSSARY
   - I = INVERT ELEVATION
   - C = CRITICAL DEPTH
   - W = WATER SURFACE ELEVATION
   - H = HEIGHT OF CHANNEL
   - E = ENERGY GRADE LINE
   - X = CURVES CROSSING OVER
   - B = BRIDGE ENTRANCE OR EXIT
   - Y = WALL ENTRANCE OR EXIT
2. STATIONS FOR POINTS AT A JUMP MAY NOT BE PLOTTED EXACTLY

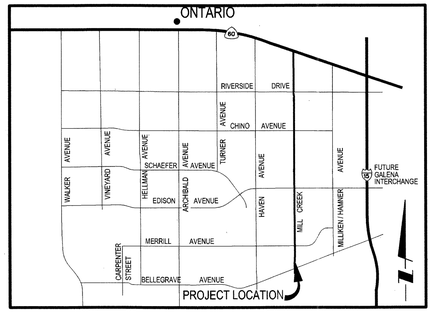
NMC BUILDERS, LLC

STORM DRAIN IMPROVEMENT PLANS FOR
MILL CREEK AVENUE
FROM BELLEGRAVE AVENUE TO RIVERSIDE DRIVE
IN THE CITY OF ONTARIO

CITY OF ONTARIO



LOCATION MAP
NOT TO SCALE



VICINITY MAP
NOT TO SCALE

SHEET INDEX

SHT. NO.	SHT. NAME	DESCRIPTION
1	TS-01	TITLE SHEET
2	GN-01	GENERAL NOTES & CONSTRUCTION NOTES
3	SD-00	INDEX MAP
4	SD-01	MILL CREEK PLAN & PROFILE STA 10+00.00 TO STA 17+00.00
5	SD-02	MILL CREEK PLAN & PROFILE STA 17+00.00 TO STA 27+00.00
6	SD-03	MILL CREEK PLAN & PROFILE STA 27+00.00 TO STA 34+00.00
7	SD-04	MILL CREEK PLAN & PROFILE STA 34+00.00 TO STA 44+00.00
8	SD-05	MILL CREEK PLAN & PROFILE STA 44+00.00 TO STA 54+00.00
9	SD-06	MILL CREEK PLAN & PROFILE STA 54+00.00 TO STA 63+00.00
10	SD-07	MILL CREEK PLAN & PROFILE STA 63+00.00 TO STA 73+00.00
11	SD-08	MILL CREEK PLAN & PROFILE STA 73+00.00 TO STA 83+00.00
12	SD-09	MILL CREEK PLAN & PROFILE STA 83+00.00 TO STA 93+00.00
13	SD-10	MILL CREEK PLAN & PROFILE STA 93+00.00 TO STA 103+00.00
14	SD-11	MILL CREEK PLAN & PROFILE STA 103+00.00 TO STA 113+00.00
15	SD-12	MILL CREEK PLAN & PROFILE STA 113+00.00 TO STA 123+00.00
16	SD-13	MILL CREEK PLAN & PROFILE STA 123+00.00 TO STA 129+96.90
17	SD-14	LATERAL PROFILES
18	SD-15	LATERAL PROFILES
19	SD-16	LATERAL PROFILES
20	SD-17	LATERAL PROFILES
21	DT-01	DETAIL SHEET – BRICK & MORTAR PLUG AND REMOVE EXISTING STUB-OUT
22	DT-02	DETAIL SHEET – TEMPORARY CSP INLET RISER
23	DT-03	DETAIL SHEET – RCB TO RCB JUNCTION
24	DT-04	DETAIL SHEET – RCB TO RCB JUNCTION
25	DT-05	DETAIL SHEET – WATER QUALITY UNIT PLAN & PROFILE
26	DT-06	DETAIL SHEET – WATER QUALITY UNIT
27	DT-07	DETAIL SHEET – INTERIM CSP RISER

Underground Service Alert of Southern California
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

RECOMMENDATION FOR ACCEPTANCE
Tina York 1/9/08
TINA M. YORK RCE #46367 DATE
EXPIRES 12/31/08 BUREAU VERITAS

CITY ACCEPTANCE OF PLANS DOES NOT RELIEVE THE DEVELOPER FROM RESPONSIBILITY FOR THE CORRECTION OF ERROR AND OMISSION DISCOVERED DURING CONSTRUCTION. UPON REQUEST OF THE CITY INSPECTOR, THE REQUIRED PLAN REVISIONS SHALL BE PROMPTLY SUBMITTED TO THE CITY ENGINEER FOR REVIEW.

TS-01

REVISIONS			
MARK	DATE	BY	APPROVED/ RCE NO.

DESIGNED BY: NL DATE: 8/20/07
DRAWN BY: NL DATE: 8/20/07
CHECKED BY: DATE: 1/9/08

CITY OF ONTARIO
RECOMMENDED BY: ~~LOUIS ABI YOUNES~~ ASSISTANT CITY ENGINEER ~~44405 EXP. 3/31/08~~ ~~R.C.E. NO.~~ 3/17/08 DATE
ACCEPTED BY: ~~JOHN P. SULLIVAN~~ CITY ENGINEER ~~24073 EXP. 12/31/07~~ ~~R.C.E. NO.~~ 6/20/08 DATE

BENCH MARK No. S.P.S.N 00789 ELEV. 785.572
LOCATION:
SAN BERNARDINO COUNTY BENCHMARK LOCATED AT THE INTERSECTION OF TURNER & RIVERSIDE AVENUES, 1/4 COR. SEC. 2/11, T2S, R7W. 2" BRASS DISK STAMPED "T2S, R7W, 1/4, S2, S11" "LS 3258" SET FLUSH IN A.C.
NGVD29 / 1990 ADJ.

STANTEC CONSULTING INC.
3105 EAST GUASTI ROAD
SUITE 100
ONTARIO, CA 91761
909.390.8880
stantec.com
Stantec
SIGNATURE 54873 C.E. NO. 6/30/08 EXP. 12-19-07 DATE

REGISTERED PROFESSIONAL ENGINEER
KEVIN BYRON BRANDT
No. 54873
Exp. 6/30/08
CIVIL
STATE OF CALIFORNIA

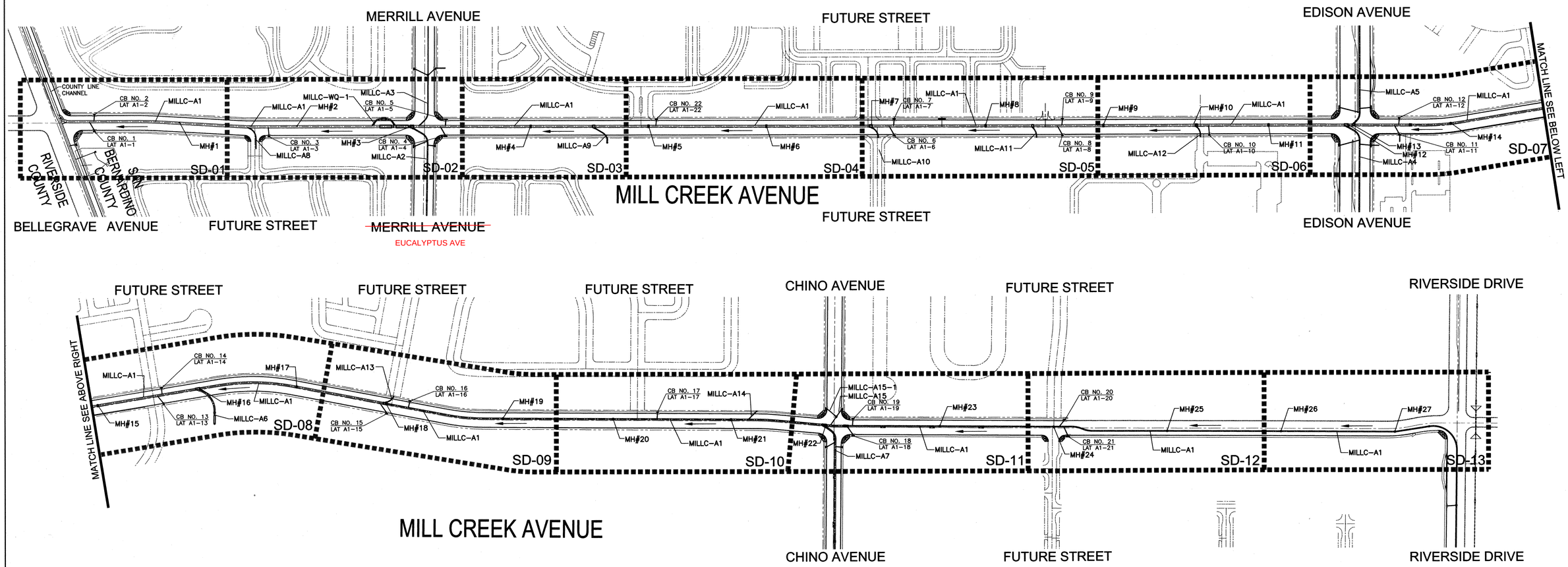
NEW MODEL COLONY (EAST)
MILL CREEK AVENUE
STORM DRAIN IMPROVEMENT PLANS
TITLE SHEET

M-442

SHEET 1 OF 27
CONTRACT
ACCOUNT
DWG. NO. D2107
D12004

MILL CREEK AVENUE - SD

DRAWING: c:\projects\14355.00\dwg\prs00172.dwg PLOTTED: 12/10/2007 10:38 AM BY: Allison, Ryan



SCALE: 1" = 200'

GRAPHIC SCALE

200 0 100 200 400

(IN FEET)
1 inch = 200 ft.

SHEET LEGEND

SD-01	DRAWING NUMBER
MILLC-A1	STORM DRAIN MAIN LINE FACILITY ID
MILLC-A1-1	STORM DRAIN LATERAL FACILITY ID
CB NO. 1	CATCH BASIN ID
MH #1	MANHOLE ID
←	FLOW DIRECTION

SD-00

Underground Service Alert of Southern California
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

REVISIONS

MARK	DATE	BY	APPROVED/ RCE NO.

DESIGNED BY: BS
DATE: 8/20/07
DRAWN BY: EH
DATE: 8/20/07
CHECKED BY:
DATE: 12/19/07

CITY OF ONTARIO

RECOMMENDED BY: for LOUIS ABI-YOUNES, ASSISTANT CITY ENGINEER ~~44485 EXP. 3/31/08~~ RCE NO. 3/17/08 DATE

ACCEPTED BY: DAVID A. SULLIVAN, CITY ENGINEER ~~24079 EXP. 12/31/07~~ RCE NO. 6/20/08 DATE

BENCH MARK No. S.P.S.N 00789 ELEV. 785.572
LOCATION:
SAN BERNARDINO COUNTY BENCHMARK LOCATED AT THE INTERSECTION OF TURNER & RIVERSIDE AVENUES, 1/4 COR. SEC. 2/11, T2S, R7W. 2" BRASS DISK STAMPED "T2S, R7W, 1/4, S2, S11" "LS 3258" SET FLUSH IN A.C.

NGVD29 / 1990 ADJ.

STANTEC CONSULTING INC.
3105 EAST GUASTI ROAD
SUITE 100
ONTARIO, CA 91761
909.390.8880
stantec.com

SIGNATURE 54873 C.E. NO. 6/30/08 EXP. 9-12-07 DATE

REGISTERED PROFESSIONAL ENGINEER
RON BRANDT
No. 54873
Exp. 6/30/08
CIVIL
STATE OF CALIFORNIA

NEW MODEL COLONY (EAST)
MILL CREEK AVENUE
STORM DRAIN IMPROVEMENT PLANS
INDEX MAP

M-442

SHEET 3 OF 27
CONTRACT
ACCOUNT
DWG. NO. D2109

D12006

DRAWING: x:\projects\14355.00\eng\prod0242.dwg PLOTTED: 9/12/2007 1:42 PM BY: Sunga, Juan

HORIZ. 1"=40'
VERT. 1"=4'

683.7 fs
682.78 new hgl
683.7 - (.02*32)=
683.06 gutter flowline

Updated HGL

STA 15+00
HGL = 684.89'

℄ MH#1 STA 15+00.00
RIM EL 686.68

EXIST GROUND

STA 9+92.84
TW = 681.5'

PROP 12" DW
679.2± INV

PROP 8" RW
677.8± INV

℄ PROP GAS LINE

PROP DRY UTILITY TRENCH

PROP FS

100 YR HGL

675.93 TOP

℄ INT MILL CREEK SD & COUNTY LINE CHANNEL

2 SACK CEMENT SLURRY FROM SD SPRINGLINE TO BOTTOM OF SS STEEL CASING

LAT MILLC-A1-1
18" RCP
INV=671.29

LAT MILLC-A1-2
18" RCP
INV=671.60

Updated Q100 = 1129.93 cfs

2012 MP Q100 = 1153.5 cfs

Updated Q100 = 1102.9 cfs

EX. 16' X 10' RCB
COUNTY LINE CHANNEL
PROJECT NO. 2-0-0300

S=0.0030

S=0.0031

INV = 669.40

PROP 36" STEEL CASING
663.9± TOP

S=0.0068

STA 9+92.84
BEGIN RCB
INV=667.23
CONTRACTOR TO FIELD VERIFY

PROP 24" SS
663.4± TOP
STA 10+11.48 BC
INV=667.29

STA 10+30.61 EC
INV=667.35

STA 13+29.56 BC
INV=668.25

STA 13+98.28 EC
INV=668.45
CB

PROP SEWER

STA 15+00
668.78 inv

STA 14+95
668.76 inv

CONSTRUCT 707.16 LF 10' x 8' RCB
Q_{100}=1119.1 CFS, V_{100}=14.0 FPS

MATCH LINE STA 17+00.00, SEE DWG. SD-02

685 675 665 655

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00

CONSTRUCTION NOTES

(400) CONSTRUCT 18" RCP (D-LOAD PER PROFILE).

(423) CONSTRUCT INTERIM CSP RISER.

(431) CONSTRUCT 10'X8' RCB PER CALTRANS STANDARD DWG. D80.

(436) CONNECT RCB TO EXISTING RCB PER DETAIL SHOWN ON SHEETS DT-03 & DT-04

(465) CONSTRUCT JUNCTION STRUCTURE PIPE TO RCB INLET ID 30" OR LESS PER SPPWC STD. PLAN 334-1.

(477) CONSTRUCT MANHOLE-CONCRETE BOX STORM DRAIN PER SPPWC 323-1.

(489) CATCH BASIN NO. 2 PER CITY OF ONTARIO STD. DWG. 3003 (W PER PLANS)

(499) REMOVE EXISTING STUBOUT.

DWG #
BELLEGRAVE AVENUE

PROP R/W
PROP DW
PROP SS
EXIST C/G
SBCFCD FLOOD CONTROL ROW-25
STREET ℄
PROP RW
N68°23'47"W
108.50'
54'
54.50'
15'
40'±00
489
FUTURE CB#2 STA 04+26.94
ST: STA 101+50.00
W=7', V=9'
BREAK OUT LIMIT SEE DT-03
PROP DRY UTILITY TRENCH
PROP GAS LINE
436 STA 9+84.74 MILLC - A1=
STA 114+54.62
COUNTY LINE CHANNEL PROJECT NO. 2-0-0300
℄ INT STA 99+90.30 MILL CREEK AVE=
STA 241+15.45 BELLEGRAVE AVE
N23°56'52"E
STA 10+30.61 EC
N00°23'47"W
98+00
99+00
101+00
STA 10+11.48 BC
431
STREET ℄
499 SEE SHT DT-01
SEE BELLEGRAVE IMPROVEMENT PLANS
N20°39'23"W
54'
55'
109'
PROP R/W
MILL CREEK AVENUE
STA 0+30.19
RISER CB 2
SEE SHT DT-07
AND SHT SD-14
423
LAT MILLC-A1-2
SEE SHT SD-14
406
N85°23'47"W
℄ INT STA 11+36.98 MILLC-A1
0+00 LAT MILLC-A1-2
469
PROP C/G
PROP R/W
N00°23'47"W
11+00
101+00
12+00
102+00
13+00
103+00
14+00
104+00
15+00
105+00
16+00
106+00
17+00
107+00
21"SS
8"RW
LAT MILLC-A1-1
SEE SHT SD-14
406
CB#1 STA 0+44.84
ST: STA 101+50.00
W=7', V=9'
489
N59°36'13"E
℄ INT STA 11+17.31 MILLC-A1
0+00 LAT MILLC-A1-1
469
STA 13+98.28 EC
STA 13+29.56 BC
PROP DRY UTILITY TRENCH
PROP GAS LINE
HIGHWAY EASEMENT
PROP DW
SD ℄
PROP SS
N02°52'09"E
SCE EASEMENT
FUTURE STREET
44'
89'
MILL CREEK AVENUE
(MILLC-A1)
MATCH LINE STA 17+00.00, SEE DWG. SD-02
BELLEGRAVE AVENUE
DWG #

NOTE:
SEE STREET IMPROVEMENT PLANS FOR DISPOSITION OF EXISTING SURFACE FEATURES

NOTE:
ALL EXISTING UNDERGROUND FACILITIES ARE TO BE PROTECTED IN PLACE UNLESS NOTED OTHERWISE ON THE PLANS.

CURVE DATA

	DELTA	RADIUS	LENGTH	TANGENT
(A)	24°20'38"	45.00'	19.12'	9.71'
(B)	03°15'56"	1206.00'	68.74'	34.38'

GRAPHIC SCALE
40 0 20 40 80
(IN FEET)
1 inch = 40 ft.

Underground Service Alert of Southern California
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

REVISIONS

MARK	DATE	BY	APPROVED/ RCE NO.

DESIGNED BY: NL DATE: 8/20/07
DRAWN BY: NL DATE: 8/20/07
CHECKED BY: DATE: 12/19/07

CITY OF ONTARIO
RECOMMENDED BY: ~~LOUIS ABI YOUNES~~ ASSISTANT CITY ENGINEER ~~44185 EXP. 3/31/08~~ ~~C.E. NO.~~ 3/17/08 DATE
ACCEPTED BY: ~~JOHN D. SULLIVAN~~ CITY ENGINEER ~~24079 EXP. 12/31/07~~ ~~C.E. NO.~~ 6/20/08 DATE

BENCH MARK No. S.P.S.N 00789 ELEV. 785.572
LOCATION:
SAN BERNARDINO COUNTY BENCHMARK LOCATED AT THE INTERSECTION OF TURNER & RIVERSIDE AVENUES, 1/4 COR. SEC. 2/11, T2S, R7W. 2" BRASS DISK STAMPED "T2S, R7W, 1/4, S2, S11" "LS 3258" SET FLUSH IN A.C.
NGVD29 / 1990 ADJ.

STANTEC CONSULTING INC.
3105 EAST GUASTI ROAD
SUITE 100
ONTARIO, CA 91761
909.390.8880
stantec.com
SIGNATURE 54873 C.E. NO. 6/30/08 EXP. 9-12-07 DATE

REGISTERED PROFESSIONAL ENGINEER
KEVIN BY RON BRANDT
No. 54873
Exp. 6/30/08
CIVIL
STATE OF CALIFORNIA

NEW MODEL COLONY (EAST)
MILL CREEK AVENUE
STORM DRAIN IMPROVEMENT PLANS
STA 10+00.00 TO STA 17+00.00

M-442

SD-01

SHEET 4 OF 27
CONTRACT
ACCOUNT
DWG. NO. D2110
D12007

DRAWING: v:\projects\14355.000\dwg\prod0063.dwg PLOTTED: 9/12/2007 2:26 PM BY: Sunga, Juan

HORIZ. 1"=40'
VERT. 1"=4'

MATCH LINE STA 17+00.00, SEE DWG. SD-01

MATCH LINE STA 27+00.00, SEE DWG. SD-03

STA 24+21
HGL = 692.14'

STA 24+01
HGL = 692.11'

STA 23+51
HGL = 689.89'

STA 24+71.67
HGL = 689.54'

STA 24+79.67
HGL = 689.6'

Updated HGL

Updated Q100 = 1102.9 cfs

2012 MP Q100 = 1102.9 cfs

℄ FUTURE STREET

EXIST GROUND

PROP FS

100 YR HGL

TRANSITION STRUCTURE

℄ MH #2 STA 20+00.00
RIM EL 691.47

℄ MH #3A STA 24+09.50
RIM EL 695.17

℄ MH #3 STA 24+91.50
RIM EL 695.91

℄ MERRILL AVENUE

EX 2" GAS
695.5± BOP

PROP GAS LINE

PROP DRY UTILITY TRENCH

PROP 6" FH
683.6± BOP

PROP 8" DW
684.7± INV

PROP 12" RW
688.4± INV
686.93 TOP

PROP 24" DW
690.2± INV

LAT MILLC-A1-3
18" RCP
INV=674.28

LAT MILLC-A8
36" RCP
INV=671.20

LAT MILLC-A1-4
18" RCP
INV=682.45

LAT MILLC-A1-5
18" RCP
INV=683.07

LAT MILLC-A3
36" RCP
INV=680.22

LAT MILLC-A2
48" RCP
INV=678.94

INV=678.92

S=0.0094

INV = 669.40

S=0.0031

INV=670.97

IDENTICAL POINT

LAT MILLC-WQ-1
60" RCP
INV=671.35

LAT MILLC-WQ-1
60" RCP
INV=671.82

INV=670.97

S=0.0031

PROP SEWER

STA 17+51.20 BC
INV=669.56

STA 18+19.25 EC
INV=669.76

STA 23+51.00
END RCB
INV=671.44

STA 24+01.00
BEGIN RCB
INV=671.61

STA 24+13.50
60" RCP DIVERSION
INV=671.65

STA 24+21.00
END RCB
INV=677.31

STA 24+21.67
BEGIN PIPE
INV=676.62

STA 24+79.67
END PIPE
INV=676.69

STA 24+93.83
BEGIN PIPE
INV=676.98

CONSTRUCT 651.00 LF 10'x8' RCB
Q_{100}= 1119.1 CFS, V_{100}= 14.0 FPS

CONSTRUCT 50.00 LF 10'x13' RCB
Q_{100}= 1096.3 CFS, V_{100}= 17.2 FPS

CONSTRUCT 206.17 L.F. 108" RCP D-LOAD=1300
Q_{100}= 1036.6 CFS, V_{100}= 16.3 FPS

CONSTRUCT 8.00 L.F. 108" RCP D-LOAD=1300
Q_{100}= 1096.3 CFS, V_{100}= 17.2 FPS

CONSTRUCTION NOTES

400 CONSTRUCT 18" RCP (D-LOAD PER PROFILE).

403 CONSTRUCT 36" RCP (D-LOAD PER PROFILE).

415 CONSTRUCT 108" RCP (D-LOAD PER PROFILE).

423 CONSTRUCT INTERIM CSP RISER.

428 CONSTRUCT BRICK & MORTAR BULKHEAD (SEE SHEET DT-01)

431 CONSTRUCT 10'X8' RCB PER CALTRANS STANDARD DWG. D80.

465 CONSTRUCT JUNCTION STRUCTURE PIPE TO RCB INLET ID 30" OR LESS PER SPPWC STD. PLAN 334-1.

466 CONSTRUCT JUNCTION STRUCTURE NO.1 PER CITY OF ONTARIO STD. DWG. 3010.

467 CONSTRUCT JUNCTION STRUCTURE NO.2 PER CITY OF ONTARIO STD. DWG. 3012.

468 CONSTRUCT JUNCTION STRUCTURE PIPE TO RCB PER SPPWC STD. PLAN 333-1.

479 CONSTRUCT MANHOLE PIPE TO PIPE (LARGE SIDE INLET) PER SPPWC STD. PLAN 322-1.

477 CONSTRUCT MANHOLE-CONCRETE BOX STORM DRAIN PER SPPWC 323-1.

489 CATCH BASIN NO. 2 PER CITY OF ONTARIO STD. DWG. 3003 (W PER PLANS)

492 CONSTRUCT CATCH BASIN WATER QUALITY STRUCTURE

DWG # _____

~~MERRILL AVENUE~~ EUCALYPTUS AVE

℄ INT STA 17+87.62 MILLC-A1
1+00 LAT MILLC-A8
RADIAL BEARING= S68°52'43"E

STA 18+19.25 EC

℄ INT STA 18+77.08 MILLC-A1
0+00 LAT MILLC-A1-3

℄ INT STA 108+31.66
MILL CREEK AVE=0+00 FUTURE ST

PROP DRY UTILITY TRENCH
PROP GAS LINE

PROP R/W

PROP C/G

PROP DW

STA 17+51.20 BC

N02°52'09"E

N31°19'4"E
STA 1+18.54 BC

LAT MILLC-A8
SEE SHT SD-14

N89°36'45"E

STA 2+09.83
END CONSTRUCTION

N84°36'13"E

LAT MILLC-A1-3
SEE SHT SD-14

WQS-3
SEE SHT DT-08

STA 1+64.48 EC

CB#3 STA 0+38.98
ST STA 108+91.22
W=7', V=9'

PROP R/W

ROAD & HIGHWAY EASEMENT

SCE EASEMENT

STREET ℄

PROP SS

PROP C/G

PROP RW

MILL CREEK AVENUE
(MILLC-A1)

℄ INT STA 24+78.41 MILLC-A1
1+00 MILLC-A2

N29°40'51"E

℄ SD MILLC-A2
SEE MERRILL AVE
IMPROVEMENT PLANS

PROP R/W

EX 2" GAS

℄ SD MILLC-A3
SEE MERRILL AVE
IMPROVEMENT PLANS

WATER QUALITY UNIT
SEE SHT DT-05

℄ INT STA 115+51.66 MILL CREEK AVE=
STA 179+48.45 MERRILL AVE

℄ INT STA 25+15.27 MILLC-A1
1+00 MILLC-A3

PROP RW

N45°23'47"W

ROAD & HIGHWAY EASEMENT

ANGLE POINT
STA 25+48.91

ROAD & HIGHWAY EASEMENT

LAT MILLC-A1-4
SEE SHT SD-14

℄ INT STA 26+07.14 MILLC-A1
0+00 LAT MILLC-A1-4

PROP GAS LINE
PROP DRY UTILITY TRENCH
PROP DW

EX 2" GAS
PROP R/W
ROAD & HIGHWAY EASEMENT

ROAD & HIGHWAY EASEMENT

℄ INT STA 26+28.82 MILLC-A1
0+00 LAT MILLC-A1-5

LAT MILLC-A1-5
SEE SHT SD-14

FUTURE CB#5
STA 0+26.94
ST STA 116+41.90
W=14', V=9'

STA 0+30.19
RISER CB 5
SEE SHT DT-07
AND SHT SD-14

PROP R/W

N85°19'10"W

N00°19'09"W

N59°40'51"E

CB#4 STA 0+44.84
ST STA 116+40.30
W=14', V=10'

SCE EASEMENT

MERRILL AVENUE
DWG # _____

JUNCTION STRUCTURE TABLE

STORM DRAIN ℄	A	B	C	D1	D2	R	S
17+87.62	30°11'47"	36"	5.00'	10.0'	10.0'	671.56	671.20
24+78.41	30°04'38"	48"	7.73'	9.0'	9.0'	678.79	678.94
25+15.27	45°00'00"	36"	3.80'	9.0'	9.0'	680.36	680.22

NOTE:
SEE STREET IMPROVEMENT PLANS FOR DISPOSITION OF EXISTING SURFACE FEATURES

NOTE:
ALL EXISTING UNDERGROUND FACILITIES ARE TO BE PROTECTED IN PLACE UNLESS NOTED OTHERWISE ON THE PLANS.

CURVE DATA

	DELTA	RADIUS	LENGTH	TANGENT
C	03°15'56"	1194.00'	68.05'	34.04'
D	58°17'41"	45.00'	45.94'	25.10'

GRAPHIC SCALE
40 0 20 40 80
(IN FEET)
1 inch = 40 ft.

TRACT # _____

Under ground Service Alert of Southern California
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

REVISIONS			
MARK	DATE	BY	APPROVED/ RCE NO.

DESIGNED BY: NL DATE: 8/20/07
DRAWN BY: NL DATE: 8/20/07
CHECKED BY: DATE: 1/30/08

CITY OF ONTARIO

RECOMMENDED BY: ~~DOUG R. YOUNG~~ ASSISTANT CITY ENGINEER ~~44485 EXP. 3/31/08 RCE. NO.~~ 3/11/08 DATE

ACCEPTED BY: ~~JOHN P. ANDERSON~~ CITY ENGINEER ~~24073 EXP. 12/31/07 RCE. NO.~~ 6/20/08 DATE

BENCH MARK No. S.P.S.N 00789 ELEV. 785.572
LOCATION:
SAN BERNARDINO COUNTY BENCHMARK LOCATED AT THE INTERSECTION OF TURNER & RIVERSIDE AVENUES, 1/4 COR. SEC. 2/11, T2S, R7W. 2" BRASS DISK STAMPED "T2S, R7W, 1/4, S2, S11" "LS 3258" SET FLUSH IN A.C.

NGVD29 / 1990 ADJ.

STANTEC CONSULTING INC.
3105 EAST GUASTI ROAD
SUITE 100
ONTARIO, CA 91761
909.390.8880
stantec.com

SIGNATURE 54873 C.E. NO. 6/30/08 EXP. 1-11-08 DATE

REGISTERED PROFESSIONAL ENGINEER KEITH BYRON BRANDT No. 54873 Exp. 6/30/08 CIVIL STATE OF CALIFORNIA

NEW MODEL COLONY (EAST)
MILL CREEK AVENUE
STORM DRAIN IMPROVEMENT PLANS
STA 17+00.00 TO STA 27+00.00

M-442

SHEET 5 OF 27
CONTRACT _____
ACCOUNT _____
DWG. NO. D2111
D12008

SD-02

DRAWING: v:\projects\14355.00\dwg\prod0084.dwg PLOTTED: 1/14/2008 3:17 PM BY: Allison, Ryan

Appendix C – Excerpt from 2012 Ontario Master Plan of Drainage with Subsequent Approved Revisions

MASTER PLAN OF DRAINAGE

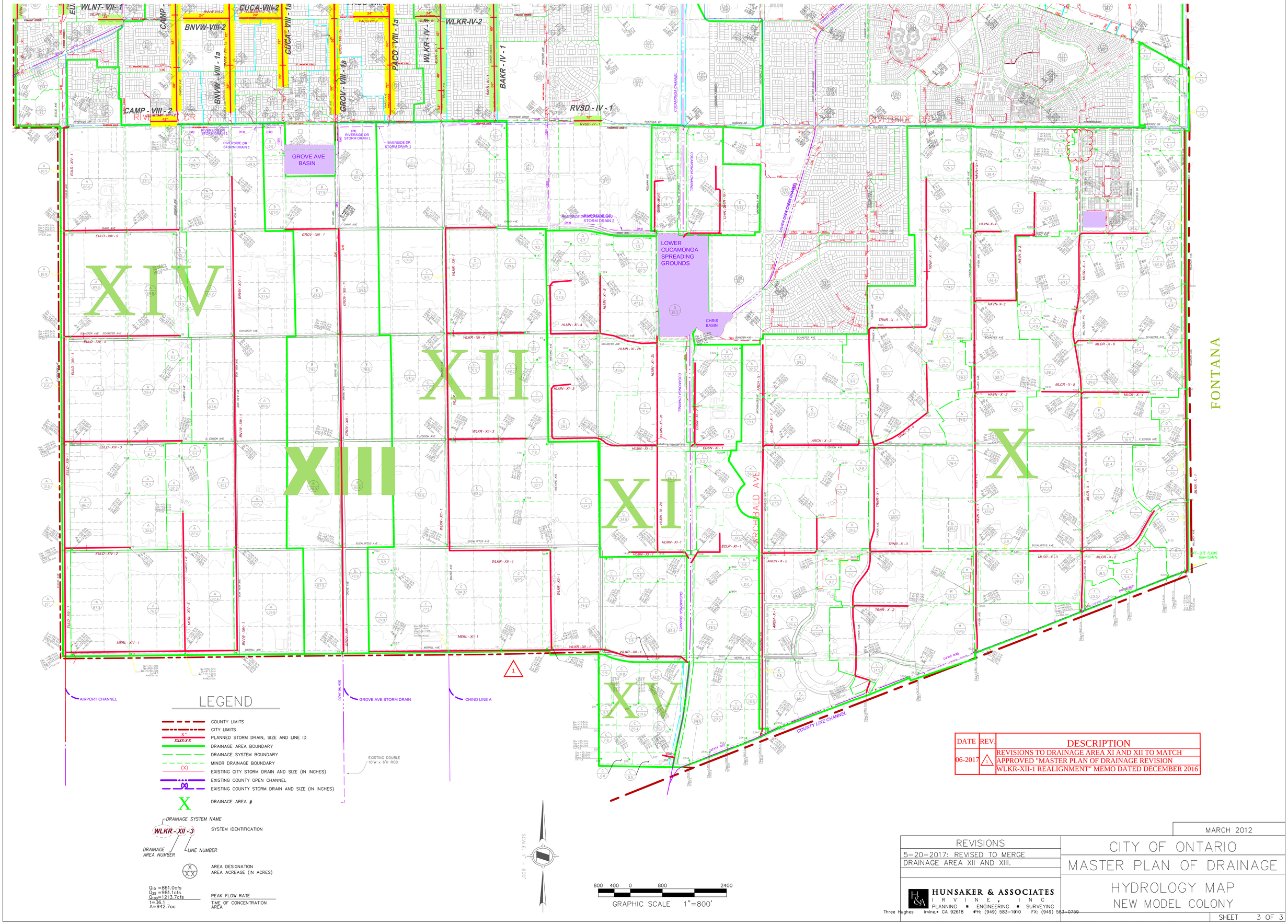
CITY OF ONTARIO

Volume I

FINAL REPORT

DECEMBER 2011
Revised: June, 2017

REGISTERED PROFESSIONAL ENGINEER
GAVIN D. POWELL
NO. C67187
EXP. 09-30-18
CIVIL
STATE OF CALIFORNIA



DATE	REV.	DESCRIPTION
06-2017	1	REVISIONS TO DRAINAGE AREA XI AND XII TO MATCH APPROVED "MASTER PLAN OF DRAINAGE REVISION WLKR-XII-1 REALIGNMENT" MEMO DATED DECEMBER 2016

MARCH 2012

REVISIONS
5-20-2017: REVISED TO MERGE DRAINAGE AREA XII AND XIII.

CITY OF ONTARIO
MASTER PLAN OF DRAINAGE
HYDROLOGY MAP
NEW MODEL COLONY

HUNSAKER & ASSOCIATES
IRVINE, INC
PLANNING ■ ENGINEERING ■ SURVEYING
Three Hughes Irvine, CA 92618 PH: (949) 583-1010 FX: (949) 583-0759

SHEET 3 OF 3

PLOTTED 12/12/2017 1:53 PM \\TUSFS1\HFIProject\140152\Eng\140152-0000\Hm\Hydrology Report\MPD Update\Civil 3D Files\New Model Hydrology Map Update.dwg

Appendix D – Excerpt from "Preliminary H&H for San Bernardino County Flood Control District County Line Channel" (Hunsaker & Associates, 2011)

PRELIMINARY HYDROLOGY AND HYDRAULIC STUDY

FOR

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICTS COUNTY LINE CHANNEL

PREPARED FOR:

CITY OF ONTARIO
CITY HALL – 303 EAST "B" STREET
ONTARIO, CA 91764

PREPARED BY:

HUNSAKER & ASSOCIATES IRVINE, INC.
THREE HUGHES
IRVINE, CA 92618

PREPARED UNDER THE SUPERVISION OF:

MOHAMMED NAJIEB KHAN ROWTHER, RCE # 37127 Date: September 6, 2011
EXPIRES: 06/30/2012

PRELIMINARY HYDROLOGY AND HYDRAULIC STUDY

FOR

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT'S COUNTY LINE CHANNEL

1. INTRODUCTION

This preliminary hydrology and hydraulics report for the existing County Line Channel has been prepared as a part of the City of Ontario's (City's) Storm Drains Master Plan Update Project. The City is updating its Master Plan of Drainage to evaluate its existing and planned storm drain facilities based on their Revised Land Use Plan, adopted the City Council on January 27, 2010.

As a part of this study, Hunsaker and Associates (H&A) has revised the master plan hydrology for all the existing and proposed future storm drain facilities serving the Old Model Colony and New Model Colony.

2. HYDROLOGIC EVALUATION

The County Line Channel is tributary to Cucamonga Creek and runs in a easterly direction along the San Bernardino/Riverside County Line. Its tributary watershed is comprised of approximately 3,610 acres, of which approximately 2,984 acres are in the easterly portion of New Model Colony and 716 acres from areas to the east of the City of Ontario. The New Model Colony portion of the watershed will be serviced by five (5) storm drain systems that will extend along Archibald Avenue, Turner Avenue, Haven Avenue, Mill Creek Avenue, and Milliken Avenue.

This report includes the revised 100-year hydrology calculation for each of the City's master planned storm drain systems tributary to the County Line Channel, along with a hydrology calculation for the mainstream (County Line Channel) based on the overall watershed.

The revised master plan hydrology study is based on the City's Revised Land Use Plan and San Bernardino County Flood Control District's (District's) Hydrology Manuel dated 1986. The revised hydrology study has been prepared using AES's Hydrology Computer Program Version 18.0, released on July 1, 2011.

Peak flow rates in the County Line Channel for the 100-year frequency storm, based on the revised hydrology and that based on the as-built plans, are summarized on the Hydrology Map

3. HYDRAULIC EVALUATION

In order to evaluate the hydraulic capacity of the existing channel to handle its tributary flows based on the revised hydrology of the watershed, hydraulic grade line (HGL) calculation using Los Angeles County Department of Public Works' WSPG program.
Hydraulic model was run for the following two conditions are included in this report:

Run 1: Using hydraulic date included in the as-built plans for the channel.

Run 2: Using peak flows calculated in the revised hydrology calculation for the County Line Channel's overall watershed.

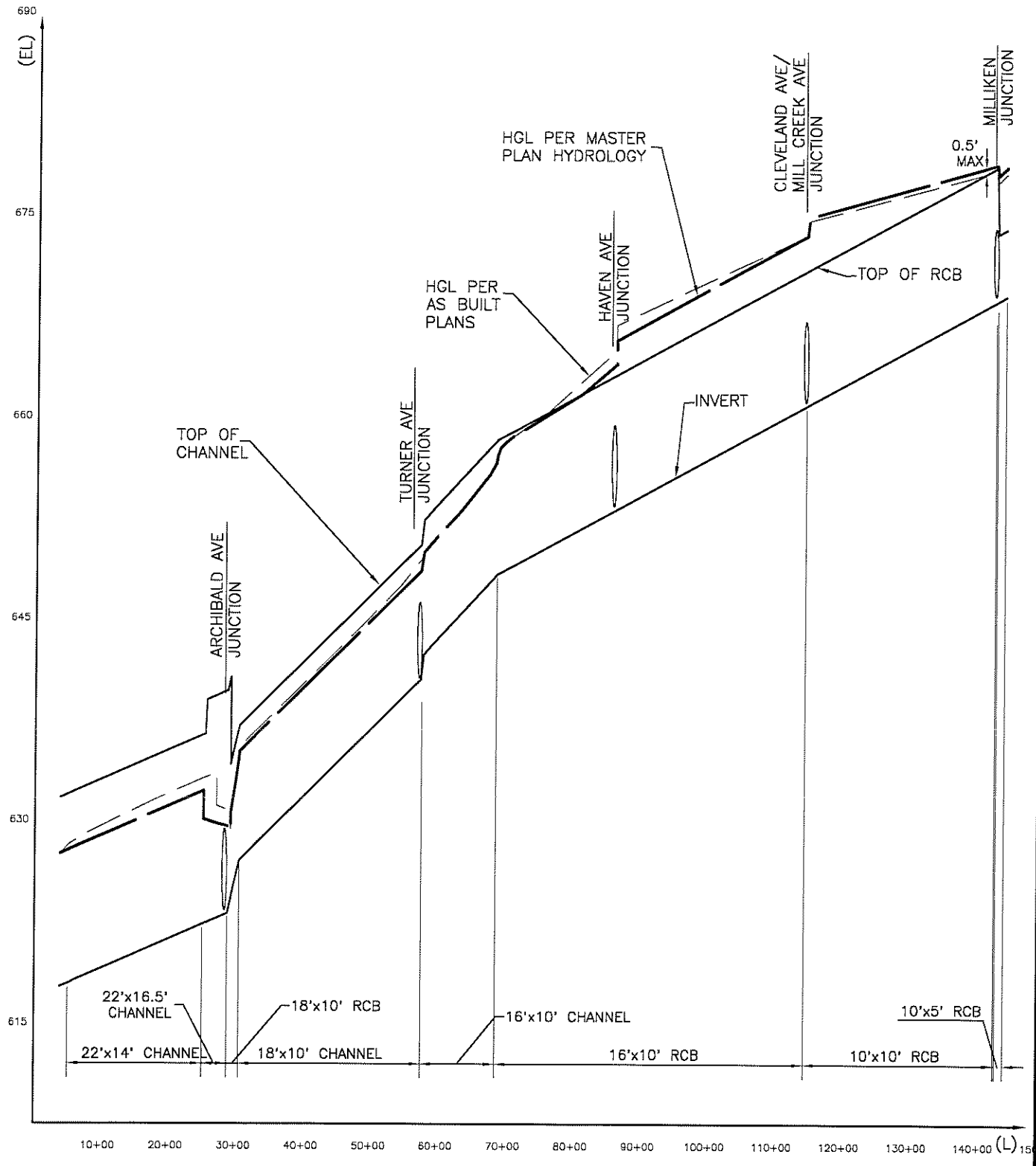
The HGL profile of channel from Cucamonga Channel to Milliken Avenue is shown in the Exhibit 1. It should be noted that 524 cfs is entering the channel from east of Milliken Avenue (from east of City Limits) under both condition, in conformance with the as-built hydraulic data.

4. CONCLUSIONS:

The HGL has a minimum of 1-foot of freeboard in the open channel section of the County Line Channel using 100-year peak flows under both conditions; i.e. as-built flows and the Revised Hydrology flows.

Although the HGL for the Revised Hydrology is slightly higher in the RC Box segment of the channel between Mill Creek Avenue and Milliken Avenue, the water surface in the channel using the revised hydrology flows are lower than the as-built flows for the remaining length of the channel.

Based on the finding of this study the existing County Line Channel has the capacity to convey 100-year frequency runoff, based on the revised hydrology of its tributary watershed.



HYDRAULIC
COUNTY LINE CHANNEL

MASTER PLAN HYDROLOGY
COUNTY LINE CHANNEL

Q_{100}

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2011 Advanced Engineering Software (aes)
             Ver. 18.0  Release Date: 07/01/2011  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* COUNTY LINE CHANNEL                                                    *
* LAKE AREAS TO HAVEN & MILL CREEK                                       *
* 100-YR STUDY                                                           *
 ************************************************************************

  FILE NAME: CHANNEL.DAT
  TIME/DATE OF STUDY: 14:00 09/02/2011
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  24.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.2000

  *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 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

  UNIT-HYDROGRAPH MODEL SELECTIONS/PARAMETERS:
    WATERSHED LAG = 0.80 * Tc
    USED "VALLEY UNDEVELOPED" S-GRAPH FOR DEVELOPMENTS OF
    2 UNITS/ACRE AND LESS; AND "VALLEY DEVELOPED" S-GRAPH
    FOR DEVELOPMENTS OF 3-4 UNITS/ACRE AND MORE.
    SIERRA MADRE DEPTH-AREA FACTORS USED.
                      AREA-AVERAGED
         DURATION    RAINFALL(INCH)
         5-MINUTES         0.44
        30-MINUTES         0.91
         1-HOUR            1.20
         3-HOUR            2.10
         6-HOUR            3.00
        24-HOUR            6.00
 *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR UNIT HYDROGRAPH METHOD*


**************************************************************************
  FLOW PROCESS FROM NODE   6000.00 TO NODE   6130.00 IS CODE = 15.1
```

```
----------------------------------------------------------------------------
 >>>>>DEFINE MEMORY BANK # 1 <<<<<
============================================================================
 PEAK FLOWRATE TABLE FILE NAME: MILLIKEN.DNA
 MEMORY BANK #  1 DEFINED AS FOLLOWS:
  STREAM       Q      Tc      Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.)   (INCH/HR)           (ACRES)     NODE
     1      172.14   27.82  0.65( 0.20) 0.31      110.5     6080.00
     2      171.75   29.40  0.65( 0.20) 0.31      114.4     6110.00
     3      161.71   36.89  0.66( 0.19) 0.30      126.0     6000.00
   TOTAL AREA(ACRES) =      126.0
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6130.00 =   12690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6130.00 TO NODE   6130.00 IS CODE = 14.0
----------------------------------------------------------------------------
 >>>>>MEMORY BANK #  1 COPIED ONTO MAIN-STREAM MEMORY<<<<<
============================================================================

 MAIN-STREAM MEMORY DEFINED AS FOLLOWS:
  STREAM       Q      Tc      Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.)   (INCH/HR)           (ACRES)     NODE
     1      172.14   27.82  0.65( 0.20) 0.31      110.5     6080.00
     2      171.75   29.40  0.65( 0.20) 0.31      114.4     6110.00
     3      161.71   36.89  0.66( 0.19) 0.30      126.0     6000.00
   TOTAL AREA(ACRES) =      126.0
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6130.00 =   12690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6130.00 TO NODE   6130.00 IS CODE =  16
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED CONSTANT SOURCE FLOW AT NODE<<<<<
============================================================================
 USER-SPECIFIED CONSTANT SOURCE FLOW =   524.00(CFS)
 USER-SPECIFIED AREA ASSOCIATED TO SOURCE FLOW =   716.18(ACRES)
 * CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =   524.00  AREA(AC.) =   716.18
 * SUMMED DATA: FLOW(CFS) =   696.14    TOTAL AREA(ACRES) =   842.18

****************************************************************************
 FLOW PROCESS FROM NODE   6130.00 TO NODE   6200.00 IS CODE =  48
----------------------------------------------------------------------------
 >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   673.60  DOWNSTREAM(FEET) =   672.60
 FLOW LENGTH(FEET) =   374.00   MANNING'S N =  0.015
 GIVEN BOX BASEWIDTH(FEET) =  10.00   GIVEN BOX HEIGHT(FEET) =  10.00
 FLOWDEPTH IN BOX IS  6.73 FEET   BOX-FLOW VELOCITY(FEET/SEC.) =  10.34
 BOX-FLOW(CFS) =     696.14
 BOX-FLOW TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =   28.43
 * TOTAL SOURCE FLOW(CFS) =     524.00
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6200.00 =   13064.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6200.00 TO NODE   6200.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   28.43
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.879
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"        C       17.10      0.57      0.500    69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
 SUBAREA AREA(ACRES) =   17.10      SUBAREA RUNOFF(CFS) =   24.56
 EFFECTIVE AREA(ACRES) =    127.61   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.63  AREA-AVERAGED Ap =  0.34
 TOTAL AREA(ACRES) =      143.1       PEAK FLOW RATE(CFS) =     191.30
```

```
  * SOURCE FLOW DATA: FLOW(CFS) =     524.00     AREA(ACRES) =      716.2
  * SUMMED DATA: FLOW(CFS) =     715.30    TOTAL AREA(ACRES) =      859.3

  ** PEAK FLOW RATE TABLE **
STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER  SOURCE
NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE      FLOW
   1      191.41   28.40    1.880  0.63( 0.21) 0.34     127.6    6080.00   524.0
   2      190.26   29.95    1.821  0.63( 0.21) 0.34     131.5    6110.00     0.0
   3      178.71   37.43    1.593  0.64( 0.21) 0.32     143.1    6000.00     0.0
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     191.41  Tc(MIN.) =   28.40
  AREA-AVERAGED Fm(INCH/HR) =  0.21  AREA-AVERAGED Fp(INCH/HR) =  0.63
  AREA-AVERAGED Ap =  0.34  EFFECTIVE AREA(ACRES) =     127.61

  * CUMULATIVE SOURCE FLOW DATA:
    FLOW(CFS) =     524.00         AREA(ACRES) =      716.2
  * SUMMED DATA:
    FLOW(CFS) =     715.41   TOTAL AREA(ACRES) =      843.8

****************************************************************************
  FLOW PROCESS FROM NODE   6200.00 TO NODE   6300.00 IS CODE =  48
----------------------------------------------------------------------------
  >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   672.60  DOWNSTREAM(FEET) =   669.40
  FLOW LENGTH(FEET) =  1140.00   MANNING'S N =  0.015
  GIVEN BOX BASEWIDTH(FEET) =  10.00   GIVEN BOX HEIGHT(FEET) =  10.00
  FLOWDEPTH IN BOX IS  6.75 FEET   BOX-FLOW VELOCITY(FEET/SEC.) =  10.60
  BOX-FLOW(CFS) =     715.41
  BOX-FLOW TRAVEL TIME(MIN.) =   1.79    Tc(MIN.) =   30.19
  * TOTAL SOURCE FLOW(CFS) =     524.00
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6300.00 =   14204.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6300.00 TO NODE   6300.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.812
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        9.40      0.57      0.500    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =     9.40      SUBAREA RUNOFF(CFS) =   12.93
  EFFECTIVE AREA(ACRES) =    137.01   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.62  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =      152.5       PEAK FLOW RATE(CFS) =     196.56

  * SOURCE FLOW DATA: FLOW(CFS) =     524.00     AREA(ACRES) =      716.2
  * SUMMED DATA: FLOW(CFS) =     720.56    TOTAL AREA(ACRES) =      868.7

  ** PEAK FLOW RATE TABLE **
STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER  SOURCE
NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE      FLOW
   1      196.89   30.12    1.814  0.62( 0.22) 0.35     137.0    6080.00   524.0
   2      195.96   31.60    1.763  0.63( 0.22) 0.35     140.9    6110.00     0.0
   3      184.39   39.02    1.553  0.63( 0.21) 0.33     152.5    6000.00     0.0
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     196.89  Tc(MIN.) =   30.12
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.62
  AREA-AVERAGED Ap =  0.35  EFFECTIVE AREA(ACRES) =     137.01

  * CUMULATIVE SOURCE FLOW DATA:
    FLOW(CFS) =     524.00         AREA(ACRES) =      716.2
  * SUMMED DATA:
```

```
    FLOW(CFS) =      720.89   TOTAL AREA(ACRES) =      853.2

 ****************************************************************************
  FLOW PROCESS FROM NODE   6300.00 TO NODE   6400.00 IS CODE =  48
 ----------------------------------------------------------------------------
  >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
 ============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   669.40  DOWNSTREAM(FEET) =   668.60
  FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.015
  GIVEN BOX BASEWIDTH(FEET) =  10.00   GIVEN BOX HEIGHT(FEET) =  10.00
  FLOWDEPTH IN BOX IS  6.86 FEET   BOX-FLOW VELOCITY(FEET/SEC.) =  10.51
  BOX-FLOW(CFS) =     720.89
  BOX-FLOW TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   30.59
  * TOTAL SOURCE FLOW(CFS) =     524.00
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6400.00 =   14497.00 FEET.

 ****************************************************************************
  FLOW PROCESS FROM NODE   6400.00 TO NODE   6400.00 IS CODE =  81
 ----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
  MAINLINE Tc(MIN.) =   30.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.798
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C       12.30      0.57      0.500    69
  PUBLIC PARK                 C        1.00      0.57      0.850    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.526
  SUBAREA AREA(ACRES) =   13.30      SUBAREA RUNOFF(CFS) =   17.95
  EFFECTIVE AREA(ACRES) =    150.31   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.62  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =      165.8       PEAK FLOW RATE(CFS) =     212.79

  * SOURCE FLOW DATA: FLOW(CFS) =     524.00     AREA(ACRES) =      716.2
  * SUMMED DATA: FLOW(CFS) =     736.79    TOTAL AREA(ACRES) =      882.0

  ** PEAK FLOW RATE TABLE **
STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER  SOURCE
NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE      FLOW
   1      212.88   30.57    1.798  0.62( 0.22) 0.36     150.3    6080.00   524.0
   2      211.53   32.03    1.749  0.62( 0.22) 0.36     154.2    6110.00     0.0
   3      197.96   39.43    1.544  0.63( 0.22) 0.35     165.8    6000.00     0.0
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     212.88  Tc(MIN.) =   30.57
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.62
  AREA-AVERAGED Ap =  0.36  EFFECTIVE AREA(ACRES) =     150.31

  * CUMULATIVE SOURCE FLOW DATA:
    FLOW(CFS) =     524.00         AREA(ACRES) =      716.2
  * SUMMED DATA:
    FLOW(CFS) =     736.88   TOTAL AREA(ACRES) =      866.5

 ****************************************************************************
  FLOW PROCESS FROM NODE   6400.00 TO NODE   5470.00 IS CODE =  48
 ----------------------------------------------------------------------------
  >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
 ============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   668.60  DOWNSTREAM(FEET) =   666.10
  FLOW LENGTH(FEET) =   990.00   MANNING'S N =  0.015
  GIVEN BOX BASEWIDTH(FEET) =  10.00   GIVEN BOX HEIGHT(FEET) =  10.00
  FLOWDEPTH IN BOX IS  7.20 FEET   BOX-FLOW VELOCITY(FEET/SEC.) =  10.24
  BOX-FLOW(CFS) =     736.88
  BOX-FLOW TRAVEL TIME(MIN.) =   1.61    Tc(MIN.) =   32.18
  * TOTAL SOURCE FLOW(CFS) =     524.00
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   5470.00 =   15487.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    5470.00 TO NODE    5470.00 IS CODE = 15.1
----------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 2 <<<<<
============================================================================
  PEAK FLOWRATE TABLE FILE NAME: MCREEK_M.DNA
  MEMORY BANK #  2 DEFINED AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      1153.54     Tc(MIN.) =    39.35
  AREA-AVERAGED Fm(INCH/HR) =  0.22     Ybar = 0.25
  TOTAL AREA(ACRES) =       886.1
  LONGEST FLOWPATH FROM NODE    5000.00 TO NODE    5470.00 =    16638.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    5470.00 TO NODE    5470.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER  SOURCE
NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE       FLOW
   1       212.88    32.11     1.746  0.62( 0.22) 0.36      150.3     6080.00    524.0
   2       211.53    33.52     1.702  0.62( 0.22) 0.36      154.2     6110.00    524.0
   3       197.96    40.86     1.511  0.63( 0.22) 0.35      165.8     6000.00    524.0

  * SOURCE FLOW DATA: FLOW(CFS) =    524.00     AREA(ACRES) =    716.18
  LONGEST FLOWPATH FROM NODE    6000.00 TO NODE    5470.00 =    15487.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  PEAK FLOW RATE(CFS) =      1153.54     Tc(MIN.) =    39.35
  AREA-AVERAGED Fm(INCH/HR) =  0.22     Ybar = 0.25
  TOTAL AREA(ACRES) =       886.1
  LONGEST FLOWPATH FROM NODE    5000.00 TO NODE    5470.00 =    16638.00 FEET.

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)=100.0%;VALLEY(UNDEV.)/DESERT=  0.0%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.66; LAG(HR) = 0.52; Fm(INCH/HR) = 0.22; Ybar = 0.25
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.95; 30M = 0.95; 1HR = 0.95;
  3HR = 0.99; 6HR = 1.00; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00    TOTAL AREA(ACRES) =      1051.9
  LONGEST FLOWPATH FROM NODE    5000.00 TO NODE    5470.00 =    16638.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0298; Lca/L=0.4,n=.0267; Lca/L=0.5,n=.0246;Lca/L=0.6,n=.0229
  TIME OF PEAK FLOW(HR) = 16.58  RUNOFF VOLUME(AF) =      404.81
  PEAK FLOW RATE(CFS) =     1359.19
  * CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =      524.00  AREA(AC.) =       716.2
  * SUMMED DATA: FLOW(CFS) =     1883.19    TOTAL AREA(ACRES) =      1768.1

****************************************************************************
  FLOW PROCESS FROM NODE    5470.00 TO NODE    4325.00 IS CODE =  48
----------------------------------------------------------------------------
  >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   666.10  DOWNSTREAM(FEET) =   658.00
  FLOW LENGTH(FEET) =  2835.00   MANNING'S N =  0.015
  GIVEN BOX BASEWIDTH(FEET) =  16.00   GIVEN BOX HEIGHT(FEET) =  10.00
  *GIVEN BOX HEIGHT(FEET) =  10.00   ESTIMATED BOX BASEWIDTH(FEET) =   17.36
  ASSUME FULL-FLOWING BOX   BOX-FLOW VELOCITY(FEET/SEC.) =  10.85
  BOX-FLOW(CFS) =     1883.19
  BOX-FLOW TRAVEL TIME(MIN.) =   4.36    Tc(MIN.) =   43.70
  * TOTAL SOURCE FLOW(CFS) =      524.00
  LONGEST FLOWPATH FROM NODE    5000.00 TO NODE    4325.00 =    19473.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    4325.00 TO NODE    4325.00 IS CODE =  12
----------------------------------------------------------------------------
```

```
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE   4325.00 TO NODE   4325.00 IS CODE =  12
--------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE   4325.00 TO NODE   4325.00 IS CODE = 15.1
--------------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<
================================================================================
  PEAK FLOWRATE TABLE FILE NAME: HAVEN_M.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)  (MIN.)   (INCH/HR)           (ACRES)    NODE
      1      744.50   18.97  0.95( 0.34) 0.36      402.2    4175.00
      2      754.97   22.69  0.95( 0.34) 0.36      463.4    4210.00
      3      733.94   32.17  0.95( 0.35) 0.37      584.6    4020.00
      4      727.00   33.00  0.95( 0.35) 0.37      591.0       1.00
      5      726.70   33.03  0.95( 0.35) 0.37      591.1    4000.00
      6      718.96   33.57  0.95( 0.35) 0.37      592.1    4045.00
    TOTAL AREA(ACRES) =      592.1
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4325.00 =   15596.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   4325.00 TO NODE   4325.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  PEAK FLOW RATE(CFS) =     1359.19    Tc(MIN.) =   43.70
  AREA-AVERAGED Fm(INCH/HR) =  0.22    Ybar = 0.25
  TOTAL AREA(ACRES) =     1051.9

  * SOURCE FLOW DATA: FLOW(CFS) =   524.00     AREA(ACRES) =   716.18
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   4325.00 =   19473.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      744.50   18.97    2.395  0.95( 0.34) 0.36      402.2    4175.00
      2      754.97   22.69    2.150  0.95( 0.34) 0.36      463.4    4210.00
      3      733.94   32.17    1.744  0.95( 0.35) 0.37      584.6    4020.00
      4      727.00   33.00    1.718  0.95( 0.35) 0.37      591.0       1.00
      5      726.70   33.03    1.717  0.95( 0.35) 0.37      591.1    4000.00
      6      718.96   33.57    1.700  0.95( 0.35) 0.37      592.1    4045.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   4325.00 =   15596.00 FEET.

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)= 99.9%;VALLEY(UNDEV.)/DESERT=  0.1%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.73; LAG(HR) = 0.58; Fm(INCH/HR) = 0.27; Ybar = 0.29
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.93; 30M = 0.93; 1HR = 0.93;
  3HR = 0.99; 6HR = 0.99; 24HR= 1.00
  UNIT-INTERVAL(MIN) =  5.00    TOTAL AREA(ACRES) =     1644.0
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   4325.00 =   19473.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0288; Lca/L=0.4,n=.0259; Lca/L=0.5,n=.0238;Lca/L=0.6,n=.0222
  TIME OF PEAK FLOW(HR) = 16.67  RUNOFF VOLUME(AF) =     595.16
  PEAK FLOW RATE(CFS) =    1861.14
  * CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =     524.00  AREA(AC.) =      716.2
  * SUMMED DATA: FLOW(CFS) =    2385.14    TOTAL AREA(ACRES) =     2360.2

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

```
 FLOW PROCESS FROM NODE   4325.00 TO NODE   3630.00 IS CODE =  48
----------------------------------------------------------------------------
 >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   658.00  DOWNSTREAM(FEET) =   654.30
 FLOW LENGTH(FEET) =  1530.00   MANNING'S N =  0.015
 GIVEN BOX BASEWIDTH(FEET) =  20.00   GIVEN BOX HEIGHT(FEET) =  10.00
 *GIVEN BOX HEIGHT(FEET) =  10.00   ESTIMATED BOX BASEWIDTH(FEET) =   22.54
 ASSUME FULL-FLOWING BOX   BOX-FLOW VELOCITY(FEET/SEC.) =  10.58
 BOX-FLOW(CFS) =    2385.14
 BOX-FLOW TRAVEL TIME(MIN.) =   2.41    Tc(MIN.) =   46.11
 * TOTAL SOURCE FLOW(CFS) =     524.00
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   3630.00 =   21003.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   3630.00 TO NODE   3630.00 IS CODE = 15.1
----------------------------------------------------------------------------
 >>>>>DEFINE MEMORY BANK # 3 <<<<<
============================================================================
 PEAK FLOWRATE TABLE FILE NAME: TURN-E.DNA
 MEMORY BANK #  3 DEFINED AS FOLLOWS:
  STREAM       Q      Tc      Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.)   (INCH/HR)           (ACRES)    NODE
     1      112.72   25.40  0.97( 0.51) 0.53       83.7    3600.00
   TOTAL AREA(ACRES) =       83.7
 LONGEST FLOWPATH FROM NODE   3600.00 TO NODE   3630.00 =    4590.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   3630.00 TO NODE   3630.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 PEAK FLOW RATE(CFS) =     1861.14    Tc(MIN.) =   46.11
 AREA-AVERAGED Fm(INCH/HR) =  0.27    Ybar = 0.29
 TOTAL AREA(ACRES) =     1644.0

 * SOURCE FLOW DATA: FLOW(CFS) =   524.00     AREA(ACRES) =   716.18
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   3630.00 =   21003.00 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      112.72   25.40    2.010  0.97( 0.51) 0.53       83.7    3600.00
 LONGEST FLOWPATH FROM NODE   3600.00 TO NODE   3630.00 =    4590.00 FEET.

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 UNIT-HYDROGRAPH DATA:
 RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
 S-GRAPH: VALLEY(DEV.)= 99.9%;VALLEY(UNDEV.)/DESERT=  0.1%
          MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
 Tc(HR) = 0.77; LAG(HR) = 0.61; Fm(INCH/HR) = 0.28; Ybar = 0.31
 USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
 DEPTH-AREA FACTORS: 5M = 0.92; 30M = 0.92; 1HR = 0.92;
 3HR = 0.99; 6HR = 0.99; 24HR= 1.00
 UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =     1727.7
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   3630.00 =   21003.00 FEET.
  EQUIVALENT BASIN FACTOR APPROXIMATIONS:
  Lca/L=0.3,n=.0285; Lca/L=0.4,n=.0255; Lca/L=0.5,n=.0234;Lca/L=0.6,n=.0219
 TIME OF PEAK FLOW(HR) = 16.67  RUNOFF VOLUME(AF) =     615.81
 PEAK FLOW RATE(CFS) =    1899.26
 * CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =     524.00  AREA(AC.) =      716.2
 * SUMMED DATA: FLOW(CFS) =    2423.26    TOTAL AREA(ACRES) =     2443.9

****************************************************************************
 FLOW PROCESS FROM NODE   3630.00 TO NODE   3700.00 IS CODE =  48
----------------------------------------------------------------------------
 >>>>>COMPUTE BOX-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED BOX SIZE (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   654.30  DOWNSTREAM(FEET) =   653.70
  FLOW LENGTH(FEET) =   227.00   MANNING'S N =  0.015
  GIVEN BOX BASEWIDTH(FEET) =  20.00   GIVEN BOX HEIGHT(FEET) =  10.00
  *GIVEN BOX HEIGHT(FEET) =  10.00   ESTIMATED BOX BASEWIDTH(FEET) =   22.02
  ASSUME FULL-FLOWING BOX   BOX-FLOW VELOCITY(FEET/SEC.) =  11.01
  BOX-FLOW(CFS) =    2423.26
  BOX-FLOW TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   46.46
  * TOTAL SOURCE FLOW(CFS) =     524.00
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   3700.00 =   21230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3700.00 TO NODE   3550.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    653.70  DOWNSTREAM(FEET) =    647.17
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1115.00   CHANNEL SLOPE =  0.0059
  CHANNEL BASE(FEET) =   16.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
  CHANNEL FLOW THRU SUBAREA(CFS) =    2423.26
  FLOW VELOCITY(FEET/SEC.) =  19.06   FLOW DEPTH(FEET) =   7.95
  TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   47.43
  * TOTAL SOURCE FLOW(CFS) =     524.00
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   3550.00 =   22345.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3550.00 TO NODE   3550.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3550.00 TO NODE   3550.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3550.00 TO NODE   3550.00 IS CODE = 15.1
----------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<
============================================================================
  PEAK FLOWRATE TABLE FILE NAME: TURN.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)  (MIN.)   (INCH/HR)          (ACRES)     NODE
      1      582.87   23.83  0.96( 0.47) 0.49      390.7    3300.00
      2      588.46   30.02  0.96( 0.47) 0.49      475.4    3085.00
      3      588.12   30.07  0.96( 0.47) 0.49      475.8    3500.00
      4      520.61   42.17  0.96( 0.48) 0.50      565.3    3056.00
      5      485.77   47.44  0.96( 0.48) 0.50      588.4    3000.00
      6      406.33   57.50  0.96( 0.48) 0.50      593.5    3021.00
    TOTAL AREA(ACRES) =      593.5
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3550.00 =   16891.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3550.00 TO NODE   3550.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  PEAK FLOW RATE(CFS) =     1899.26    Tc(MIN.) =   47.43
  AREA-AVERAGED Fm(INCH/HR) =  0.28    Ybar = 0.31
  TOTAL AREA(ACRES) =     1727.7

  * SOURCE FLOW DATA: FLOW(CFS) =   524.00     AREA(ACRES) =   716.18
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   3550.00 =   22345.00 FEET.
```

```
** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1      582.87   23.83    2.089  0.96( 0.47) 0.49     390.7    3300.00
    2      588.46   30.02    1.818  0.96( 0.47) 0.49     475.4    3085.00
    3      588.12   30.07    1.816  0.96( 0.47) 0.49     475.8    3500.00
    4      520.61   42.17    1.483  0.96( 0.48) 0.50     565.3    3056.00
    5      485.77   47.44    1.382  0.96( 0.48) 0.50     588.4    3000.00
    6      406.33   57.50    1.231  0.96( 0.48) 0.50     593.5    3021.00
LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3550.00 =   16891.00 FEET.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
UNIT-HYDROGRAPH DATA:
RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
S-GRAPH: VALLEY(DEV.)= 99.9%;VALLEY(UNDEV.)/DESERT=  0.1%
         MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
Tc(HR) = 0.79; LAG(HR) = 0.63; Fm(INCH/HR) = 0.33; Ybar = 0.36
USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
DEPTH-AREA FACTORS: 5M = 0.90; 30M = 0.90; 1HR = 0.90;
3HR = 0.98; 6HR = 0.99; 24HR= 1.00
UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =     2321.1
LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   3550.00 =   22345.00 FEET.
 EQUIVALENT BASIN FACTOR APPROXIMATIONS:
 Lca/L=0.3,n=.0278; Lca/L=0.4,n=.0249; Lca/L=0.5,n=.0229;Lca/L=0.6,n=.0214
TIME OF PEAK FLOW(HR) = 16.67  RUNOFF VOLUME(AF) =     770.36
PEAK FLOW RATE(CFS) =    2342.65
* CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =     524.00  AREA(AC.) =      716.2
* SUMMED DATA: FLOW(CFS) =    2866.65    TOTAL AREA(ACRES) =     3037.3

****************************************************************************
 FLOW PROCESS FROM NODE   3550.00 TO NODE   2550.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    647.17  DOWNSTREAM(FEET) =    634.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2391.00   CHANNEL SLOPE =  0.0055
 CHANNEL BASE(FEET) =   18.00   "Z" FACTOR =   0.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
 CHANNEL FLOW THRU SUBAREA(CFS) =    2866.65
 FLOW VELOCITY(FEET/SEC.) =  19.41   FLOW DEPTH(FEET) =   8.20
 TRAVEL TIME(MIN.) =   2.05   Tc(MIN.) =   49.48
 * TOTAL SOURCE FLOW(CFS) =     524.00
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   2550.00 =   24736.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2550.00 TO NODE   2540.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    634.00  DOWNSTREAM(FEET) =    630.51
 CHANNEL LENGTH THRU SUBAREA(FEET) =   470.00   CHANNEL SLOPE =  0.0074
 CHANNEL BASE(FEET) =   18.00   "Z" FACTOR =   0.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
 CHANNEL FLOW THRU SUBAREA(CFS) =    2866.65
 FLOW VELOCITY(FEET/SEC.) =  21.67   FLOW DEPTH(FEET) =   7.35
 TRAVEL TIME(MIN.) =   0.36   Tc(MIN.) =   49.84
 * TOTAL SOURCE FLOW(CFS) =     524.00
 LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   2540.00 =   25206.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2540.00 TO NODE   2540.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   2540.00 TO NODE   2540.00 IS CODE = 15.1
----------------------------------------------------------------------------
 >>>>>DEFINE MEMORY BANK # 1 <<<<<
```

```
==============================================================================
  PEAK FLOWRATE TABLE FILE NAME: ARCH.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)  (MIN.)   (INCH/HR)          (ACRES)     NODE
      1      767.58   16.84  0.61( 0.32) 0.52      334.4     2638.00
      2      778.74   17.86  0.61( 0.32) 0.52      353.2     2660.00
      3      779.78   18.02  0.61( 0.32) 0.52      355.7     2245.00
      4      779.13   28.95  0.63( 0.33) 0.52      522.8     2600.00
      5      778.78   30.22  0.63( 0.33) 0.52      540.6     2050.00
      6      732.57   34.59  0.64( 0.33) 0.52      569.3     2215.00
      7      718.55   35.65  0.64( 0.33) 0.52      572.3     2110.00
    TOTAL AREA(ACRES) =      572.3
  LONGEST FLOWPATH FROM NODE   2050.00 TO NODE   2540.00 =   11670.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2540.00 TO NODE   2540.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  PEAK FLOW RATE(CFS) =     2342.65    Tc(MIN.) =   49.84
  AREA-AVERAGED Fm(INCH/HR) =  0.33    Ybar = 0.36
  TOTAL AREA(ACRES) =     2321.1

  * SOURCE FLOW DATA: FLOW(CFS) =   524.00     AREA(ACRES) =   716.18
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   2540.00 =   25206.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1      767.58   16.84    2.572  0.61( 0.32) 0.52      334.4     2638.00
      2      778.74   17.86    2.483  0.61( 0.32) 0.52      353.2     2660.00
      3      779.78   18.02    2.470  0.61( 0.32) 0.52      355.7     2245.00
      4      779.13   28.95    1.858  0.63( 0.33) 0.52      522.8     2600.00
      5      778.78   30.22    1.811  0.63( 0.33) 0.52      540.6     2050.00
      6      732.57   34.59    1.670  0.64( 0.33) 0.52      569.3     2215.00
      7      718.55   35.65    1.640  0.64( 0.33) 0.52      572.3     2110.00
  LONGEST FLOWPATH FROM NODE   2050.00 TO NODE   2540.00 =   11670.00 FEET.

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  UNIT-HYDROGRAPH DATA:
  RAINFALL(INCH): 5M= 0.44;30M= 0.91;1H= 1.20;3H= 2.10;6H= 3.00;24H= 6.00
  S-GRAPH: VALLEY(DEV.)= 99.6%;VALLEY(UNDEV.)/DESERT=  0.4%
           MOUNTAIN=  0.0%;FOOTHILL=  0.0%;DESERT(UNDEV.)=  0.0%
  Tc(HR) = 0.83; LAG(HR) = 0.66; Fm(INCH/HR) = 0.33; Ybar = 0.35
  USED SIERRA MADRE DEPTH-AREA CURVES WITH AMC  II CONDITION.
  DEPTH-AREA FACTORS: 5M = 0.87; 30M = 0.87; 1HR = 0.87;
  3HR = 0.98; 6HR = 0.99; 24HR= 0.99
  UNIT-INTERVAL(MIN) =  5.00   TOTAL AREA(ACRES) =     2893.4
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   2540.00 =   25206.00 FEET.
   EQUIVALENT BASIN FACTOR APPROXIMATIONS:
   Lca/L=0.3,n=.0266; Lca/L=0.4,n=.0238; Lca/L=0.5,n=.0219;Lca/L=0.6,n=.0204
  TIME OF PEAK FLOW(HR) = 16.75  RUNOFF VOLUME(AF) =     960.36
  PEAK FLOW RATE(CFS) =    2716.75
  * CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =     524.00  AREA(AC.) =      716.2
  * SUMMED DATA: FLOW(CFS) =    3240.75    TOTAL AREA(ACRES) =     3609.6
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     2893.4  TC(MIN.) =     49.84
  AREA-AVERAGED Fm(INCH/HR)=  0.33   Ybar =  0.35
  PEAK FLOW RATE(CFS)    =   2716.75
  * CUMULATIVE SOURCE FLOW DATA: FLOW(CFS) =     524.00  AREA(AC.) =      716.2
  * SUMMED DATA: FLOW(CFS) =    3240.75    TOTAL AREA(ACRES) =     3609.6
==============================================================================
==============================================================================
  END OF INTEGRATED RATIONAL/UNIT-HYDROGRAPH METHOD ANALYSIS
```

WSPG

HYDRAULICS FOR COUNTY LINE CHANNEL PER MASTER PLAN HYDROLOGY

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	2	0	.000	14.000	22.000			.00										
CD	2	3	0	.000	14.000	22.000	.000	.000	.00										
CD	3	2	0	.000	16.500	22.000			.00										
CD	5	4	1		8.000														
CD	6	3	0	.000	10.000	18.000	.000	.000	.00										
CD	8	2	0	.000	10.000	18.000			.00										
CD	9	4	1		7.500														
CD	10	2	0	.000	10.000	16.000			.00										
CD	11	3	0	.000	10.000	10.000	.000	.000	.00										
CD	12	3	0	.000	10.000	16.000	.000	.000	.00										
CD	13	4	1		2.000														
CD	14	4	1		9.000														
CD	15	4	1		5.000														
CD	16	3	0	.000	5.000	10.000	.000	.000	.00										

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

W.O. #915-1T, ONTARIO MASTER PLAN OF DRAINAGE

HEADING LINE NO 2 IS -

100-YR STUDY, COUNTY LINE CHANNEL

HEADING LINE NO 3 IS -

LAKE AREAS TO HAVEN & MILL CREEK

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	410.000	625.140	1	635.000

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	543.890	625.430	1	.014	.000	.000	.000	0

ELEMENT NO 3 IS A WALL EXIT *

U/S DATA	STATION	INVERT	SECT
	543.890	625.430	2

ELEMENT NO 4 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	568.520	625.480	2	.014	.000	.000	.000	0

ELEMENT NO 5 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	600.000	625.560	2	.014	300.012	6.012	.000	0

ELEMENT NO 6 IS A WALL ENTRANCE *

U/S DATA	STATION	INVERT	SECT	FP
	600.000	625.560	1	.014

ELEMENT NO 7 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	786.920	625.970	1	.014	300.001	35.699	.000	0

ELEMENT NO 8 IS A REACH * * *

```
                    U/S DATA    STATION    INVERT  SECT              N                          RADIUS     ANGLE      ANG PT  MAN H
                                2557.090   629.860    1             .014                          .000      .000       .000      0
 ELEMENT NO    9 IS A REACH                    *         *     *
                    U/S DATA    STATION    INVERT  SECT              N                          RADIUS     ANGLE      ANG PT  MAN H
                                2574.000   629.900    1             .014                       2999.587     .323       .000      0
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
 ELEMENT NO   10 IS A REACH                    *         *     *
                    U/S DATA    STATION    INVERT  SECT              N                          RADIUS     ANGLE      ANG PT  MAN H
                                2814.930   630.430    3             .014                       3000.276    4.601       .000      0
 ELEMENT NO   11 IS A REACH                    *         *     *
                    U/S DATA    STATION    INVERT  SECT              N                          RADIUS     ANGLE      ANG PT  MAN H
                                2883.890   630.580    3             .014                          .000      .000       .000      0
 ELEMENT NO   12 IS A JUNCTION               *         *     *     *                   *          *                    *
                    U/S DATA    STATION    INVERT  SECT LAT-1 LAT-2   N       Q3          Q4     INVERT-3 INVERT-4  PHI 3   PHI 4
                                2928.890   631.590    3     5     0   .014    374.100       .000   631.500       .000 -30.000       .000
                                                                                                  RADIUS     ANGLE
                                                                                                     .000      .000
                                                          W S P G W                                                      PAGE NO    3
                          WATER SURFACE PROFILE - ELEMENT CARD LISTING
 ELEMENT NO   13 IS A  WALL  EXIT                        *
                    U/S DATA    STATION    INVERT  SECT
                                2928.890   631.590    6
 ELEMENT NO   14 IS A REACH                    *         *     *
                    U/S DATA    STATION    INVERT  SECT              N                          RADIUS     ANGLE      ANG PT  MAN H
                                3058.890   634.500    6             .014                          .000      .000       .000      0
 ELEMENT NO   15 IS A  WALL  ENTRANCE                   *
                    U/S DATA    STATION    INVERT  SECT             FP
                                3058.890   634.500    8             .014
 ELEMENT NO   16 IS A REACH                    *         *     *
                    U/S DATA    STATION    INVERT  SECT              N                          RADIUS     ANGLE      ANG PT  MAN H
                                3372.390   636.070    8             .014                          .000      .000       .000      0
 ELEMENT NO   17 IS A REACH                    *         *     *
                    U/S DATA    STATION    INVERT  SECT              N                          RADIUS     ANGLE      ANG PT  MAN H
                                3630.230   637.360    8             .014                       3000.233    4.924       .000      0
 ELEMENT NO   18 IS A REACH                    *         *     *
                    U/S DATA    STATION    INVERT  SECT              N                          RADIUS     ANGLE      ANG PT  MAN H
                                5742.000   647.920    8             .014                          .000      .000       .000      0
 ELEMENT NO   19 IS A JUNCTION               *         *     *     *                   *          *                    *
                    U/S DATA    STATION    INVERT  SECT LAT-1 LAT-2   N       Q3          Q4     INVERT-3 INVERT-4  PHI 3   PHI 4
                                5784.000   649.780   10     9     0   .014    481.600       .000   650.000       .000 -30.000       .000
                                                                                                  RADIUS     ANGLE
                                                                                                     .000      .000
 ELEMENT NO   20 IS A REACH                    *         *     *
                    U/S DATA    STATION    INVERT  SECT              N                          RADIUS     ANGLE      ANG PT  MAN H
                                5851.000   650.150   10             .014                          .000      .000       .000      0
 ELEMENT NO   21 IS A TRANSITION               *         *     *
                    U/S DATA    STATION    INVERT  SECT              N                          RADIUS     ANGLE
                                5871.000   650.260   12             .013                          .000      .000
WARNING - ADJACENT SECTIONS ARE NOT IDENTICAL - SEE SECTION NUMBERS AND CHANNEL DEFINITIONS
 ELEMENT NO   22 IS A REACH                    *         *     *
                    U/S DATA    STATION    INVERT  SECT              N                          RADIUS     ANGLE      ANG PT  MAN H
```

6865.290 655.730 10 .014 .000 .000 .000 0

ELEMENT NO 23 IS A WALL EXIT *

U/S DATA STATION INVERT SECT
6865.290 655.730 12

W S P G W
WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 24 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
6960.420 655.990 12 .014 499.912 10.903 .000 0

ELEMENT NO 25 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
6997.170 656.090 12 .014 .000 .000 .000 0

ELEMENT NO 26 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
7092.320 656.350 12 .014 500.017 -10.903 .000 0

ELEMENT NO 27 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
8619.320 660.530 12 .014 .000 .000 .000 0

ELEMENT NO 28 IS A JUNCTION * * * * * * *

U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
8619.330 660.540 12 5 0 .014 501.900 .000 661.500 .000 -30.000 .000

RADIUS ANGLE
.000 .000

ELEMENT NO 29 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
11452.000 668.300 12 .014 .000 .000 .000 0

ELEMENT NO 30 IS A JUNCTION * * * * * * *

U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
11485.000 668.390 11 14 0 .014 1146.300 .000 668.350 .000 -30.000 .000

RADIUS ANGLE
.000 .000

ELEMENT NO 31 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
14277.000 676.040 11 .014 .000 .000 .000 0

ELEMENT NO 32 IS A JUNCTION * * * * * * *

U/S DATA STATION INVERT SECT LAT-1 LAT-2 N Q3 Q4 INVERT-3 INVERT-4 PHI 3 PHI 4
14295.000 676.090 16 15 0 .014 212.900 .000 676.500 .000 -30.000 .000

RADIUS ANGLE
.000 .000

W S P G W
WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 33 IS A REACH * * *

U/S DATA STATION INVERT SECT N RADIUS ANGLE ANG PT MAN H
14420.000 676.430 16 .014 .000 .000 .000 0

ELEMENT NO 34 IS A SYSTEM HEADWORKS * *

U/S DATA STATION INVERT SECT W S ELEV
14420.000 676.430 16 676.430

WATER SURFACE PROFILE LISTING

Date: 8- 4-2011 Time: 8:46:59

W.O. #915-1T, ONTARIO MASTER PLAN OF DRAINAGE
100-YR STUDY, COUNTY LINE CHANNEL
LAKE AREAS TO HAVEN & MILL CREEK

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
410.000	625.140	9.860	635.000	3240.80	14.94	3.47	638.47	.00	8.77	22.00	14.000	22.000	.00	0 .0
133.890	.0022					.0022	.29	9.86	.84	9.92	.014	.00	.00	RECTANG
543.890	625.430	9.874	635.304	3240.80	14.92	3.46	638.76	.00	8.77	22.00	14.000	22.000	.00	0 .0
WALL EXIT														
543.890	625.430	9.874	635.304	3240.80	14.92	3.46	638.76	.00	8.77	22.00	14.000	22.000	.00	0 .0
24.630	.0020					.0022	.05	9.87	.84	10.16	.014	.00	.00	BOX
568.520	625.480	9.887	635.367	3240.80	14.90	3.45	638.81	.25	8.77	22.00	14.000	22.000	.00	0 .0
31.480	.0025					.0022	.07	10.14	.83	9.35	.014	.00	.00	BOX
WALL ENTRANCE														
600.000	625.560	9.852	635.412	3240.80	14.95	3.47	638.88	.25	8.77	22.00	14.000	22.000	.00	0 .0
186.920	.0022					.0022	.41	10.11	.84	9.87	.014	.00	.00	RECTANG
786.920	625.970	9.858	635.828	3240.80	14.94	3.47	639.30	.00	8.77	22.00	14.000	22.000	.00	0 .0
1724.235	.0022					.0022	3.79	9.86	.84	9.86	.014	.00	.00	RECTANG
2511.155	629.759	9.863	639.622	3240.80	14.94	3.46	643.09	.00	8.77	22.00	14.000	22.000	.00	0 .0
16.979	.0022					.0022	.04	9.86	.84	9.86	.014	.00	.00	RECTANG
2528.135	629.796	9.863	639.659	3240.80	14.94	3.46	643.12	.00	8.77	22.00	14.000	22.000	.00	0 .0
HYDRAULIC JUMP														

W.O. #915-1T, ONTARIO MASTER PLAN OF DRAINAGE
100-YR STUDY, COUNTY LINE CHANNEL
LAKE AREAS TO HAVEN & MILL CREEK

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
2528.135	629.796	7.755	637.551	3240.80	19.00	5.60	643.15	.00	8.77	22.00	14.000	22.000	.00	0 .0
28.955	.0022					.0043	.13	7.76	1.20	9.86	.014	.00	.00	RECTANG
2557.090	629.860	7.635	637.495	3240.80	19.29	5.78	643.28	.04	8.77	22.00	14.000	22.000	.00	0 .0
16.910	.0024					.0045	.08	7.68	1.23	9.60	.014	.00	.00	RECTANG
2574.000	629.900	7.568	637.468	3240.80	19.46	5.88	643.35	.04	8.77	22.00	16.500	22.000	.00	0 .0
56.093	.0022					.0048	.27	7.61	1.25	9.86	.014	.00	.00	RECTANG
2630.093	630.023	7.340	637.363	3240.80	20.07	6.25	643.62	.05	8.77	22.00	16.500	22.000	.00	0 .0
91.275	.0022					.0053	.48	7.39	1.31	9.86	.014	.00	.00	RECTANG
2721.368	630.224	6.998	637.223	3240.80	21.05	6.88	644.10	.05	8.77	22.00	16.500	22.000	.00	0 .0
93.562	.0022					.0061	.57	7.05	1.40	9.86	.014	.00	.00	RECTANG
2814.930	630.430	6.673	637.103	3240.80	22.08	7.57	644.67	.00	8.77	22.00	16.500	22.000	.00	0 .0
68.960	.0022					.0068	.47	6.67	1.51	9.90	.014	.00	.00	RECTANG
2883.890	630.580	6.442	637.022	3240.80	22.87	8.12	645.14	.00	8.77	22.00	16.500	22.000	.00	0 .0
JUNCT STR	.0224					.0092	.41	6.44	1.59		.014	.00	.00	RECTANG
2928.890	631.590	5.053	636.643	2866.70	25.79	10.33	646.97	.00	8.08	22.00	16.500	22.000	.00	0 .0
WALL EXIT														
2928.890	631.590	6.384	637.974	2866.70	24.95	9.66	647.64	.00	9.24	18.00	10.000	18.000	.00	0 .0
39.505	.0224					.0090	.35	6.38	1.74	4.72	.014	.00	.00	BOX

WATER SURFACE PROFILE LISTING

Date: 8- 4-2011 Time: 8:46:59

W.O. #915-1T, ONTARIO MASTER PLAN OF DRAINAGE
100-YR STUDY, COUNTY LINE CHANNEL
LAKE AREAS TO HAVEN & MILL CREEK

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
2968.395	632.474	6.673	639.147	2866.70	23.87	8.85	647.99	.00	9.24	18.00	10.000	18.000	.00	0 .0
33.063	.0224					.0079	.26	6.67	1.63	4.72	.014	.00	.00	BOX
3001.458	633.214	6.998	640.213	2866.70	22.76	8.04	648.25	.00	9.24	18.00	10.000	18.000	.00	0 .0
25.218	.0224					.0069	.18	7.00	1.52	4.72	.014	.00	.00	BOX
3026.676	633.779	7.340	641.119	2866.70	21.70	7.31	648.43	.00	9.24	18.00	10.000	18.000	.00	0 .0
18.803	.0224					.0061	.11	7.34	1.41	4.72	.014	.00	.00	BOX
3045.479	634.200	7.698	641.898	2866.70	20.69	6.65	648.54	.00	9.24	18.00	10.000	18.000	.00	0 .0
13.411	.0224					.0054	.07	7.70	1.31	4.72	.014	.00	.00	BOX
3058.890	634.500	8.075	642.575	2866.70	19.72	6.04	648.62	.00	9.24	18.00	10.000	18.000	.00	0 .0
313.500	.0050					.0050	1.57	8.07	1.22	8.07	.014	.00	.00	RECTANG
3372.390	636.070	8.077	644.147	2866.70	19.72	6.04	650.18	.07	9.24	18.00	10.000	18.000	.00	0 .0
257.840	.0050					.0050	1.29	8.15	1.22	8.08	.014	.00	.00	RECTANG
3630.230	637.360	8.078	645.438	2866.70	19.72	6.04	651.47	.00	9.24	18.00	10.000	18.000	.00	0 .0
1522.024	.0050					.0050	7.61	8.08	1.22	8.08	.014	.00	.00	RECTANG
5152.254	644.971	8.078	653.049	2866.70	19.72	6.04	659.08	.00	9.24	18.00	10.000	18.000	.00	0 .0
589.746	.0050					.0050	2.96	8.08	1.22	8.08	.014	.00	.00	RECTANG
5742.000	647.920	8.060	655.980	2866.70	19.76	6.06	662.04	.00	9.24	18.00	10.000	18.000	.00	0 .0
JUNCT STR	.0443					.0053	.22	8.06	1.23		.014	.00	.00	RECTANG

WATER SURFACE PROFILE LISTING

Date: 8- 4-2011 Time: 8:46:59

W.O. #915-1T, ONTARIO MASTER PLAN OF DRAINAGE
100-YR STUDY, COUNTY LINE CHANNEL
LAKE AREAS TO HAVEN & MILL CREEK

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
5784.000	649.780	7.618	657.398	2385.10	19.57	5.95	663.34	.00	8.84	16.00	10.000	16.000	.00	0 .0
67.000	.0055					.0055	.37	7.62	1.25	7.62	.014	.00	.00	RECTANG
5851.000	650.150	7.616	657.766	2385.10	19.57	5.95	663.71	.00	8.84	16.00	10.000	16.000	.00	0 .0
TRANS STR	.0055					.0048	.10	7.62	1.25		.013	.00	.00	RECTANG
5871.000	650.260	7.637	657.897	2385.10	19.52	5.92	663.81	.00	8.84	16.00	10.000	16.000	.00	0 .0
448.823	.0055					.0055	2.46	7.64	1.24	7.63	.014	.00	.00	RECTANG
6319.823	652.729	7.659	660.388	2385.10	19.46	5.88	666.27	.00	8.84	16.00	10.000	16.000	.00	0 .0
429.875	.0055					.0051	2.20	7.66	1.24	7.63	.014	.00	.00	RECTANG
6749.698	655.094	8.033	663.127	2385.10	18.56	5.35	668.47	.00	8.84	16.00	10.000	16.000	.00	0 .0
95.396	.0055					.0045	.43	8.03	1.15	7.63	.014	.00	.00	RECTANG
6845.094	655.619	8.425	664.044	2385.10	17.69	4.86	668.91	.00	8.84	16.00	10.000	16.000	.00	0 .0
20.196	.0055					.0040	.08	8.42	1.07	7.63	.014	.00	.00	RECTANG
6865.290	655.730	8.837	664.567	2385.10	16.87	4.42	668.99	.28	8.84	16.00	10.000	16.000	.00	0 .0
WALL EXIT														
6865.290	655.730	8.837	664.567	2385.10	16.87	4.42	668.99	.14	8.84	16.00	10.000	16.000	.00	0 .0
38.218	.0027					.0033	.13	8.98	1.00	10.00	.014	.00	.00	BOX
6903.508	655.834	9.268	665.103	2385.10	16.08	4.02	669.12	.13	8.84	16.00	10.000	16.000	.00	0 .0
56.912	.0027					.0031	.18	9.40	.93	10.00	.014	.00	.00	BOX

---------- WARNING - Flow depth near top of box conduit ----------

WATER SURFACE PROFILE LISTING

Date: 8- 4-2011 Time: 8:46:59

W.O. #915-1T, ONTARIO MASTER PLAN OF DRAINAGE
100-YR STUDY, COUNTY LINE CHANNEL
LAKE AREAS TO HAVEN & MILL CREEK

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
6960.420	655.990	9.443	665.433	2385.10	15.79	3.87	669.30	.00	8.84	16.00	10.000	16.000	.00	0 .0
36.750	.0027					.0031	.11	9.44	.91	10.00	.014	.00	.00	BOX
				WARNING - Flow depth near top of box conduit										
6997.170	656.090	9.517	665.607	2385.10	15.66	3.81	669.42	.12	8.84	16.00	10.000	16.000	.00	0 .0
95.150	.0027					.0030	.28	9.64	.89	10.00	.014	.00	.00	BOX
				WARNING - Flow depth near top of box conduit										
7092.320	656.350	9.644	665.994	2385.10	15.46	3.71	669.70	.00	8.84	16.00	10.000	16.000	.00	0 .0
1025.902	.0027					.0027	2.77	9.64	.88	10.00	.014	.00	.00	BOX
				WARNING - Flow depth near top of box conduit										
8118.222	659.158	10.000	669.158	2385.10	14.91	3.45	672.61	.00	8.84	16.00	10.000	16.000	.00	0 .0
501.099	.0027					.0044	2.21	10.00	.83	10.00	.014	.00	.00	BOX
8619.320	660.530	10.837	671.367	2385.10	14.91	3.45	674.82	.00	8.84	16.00	10.000	16.000	.00	0 .0
JUNCT STR 1.0187						.0027	.00	10.84	.83		.014	.00	.00	BOX

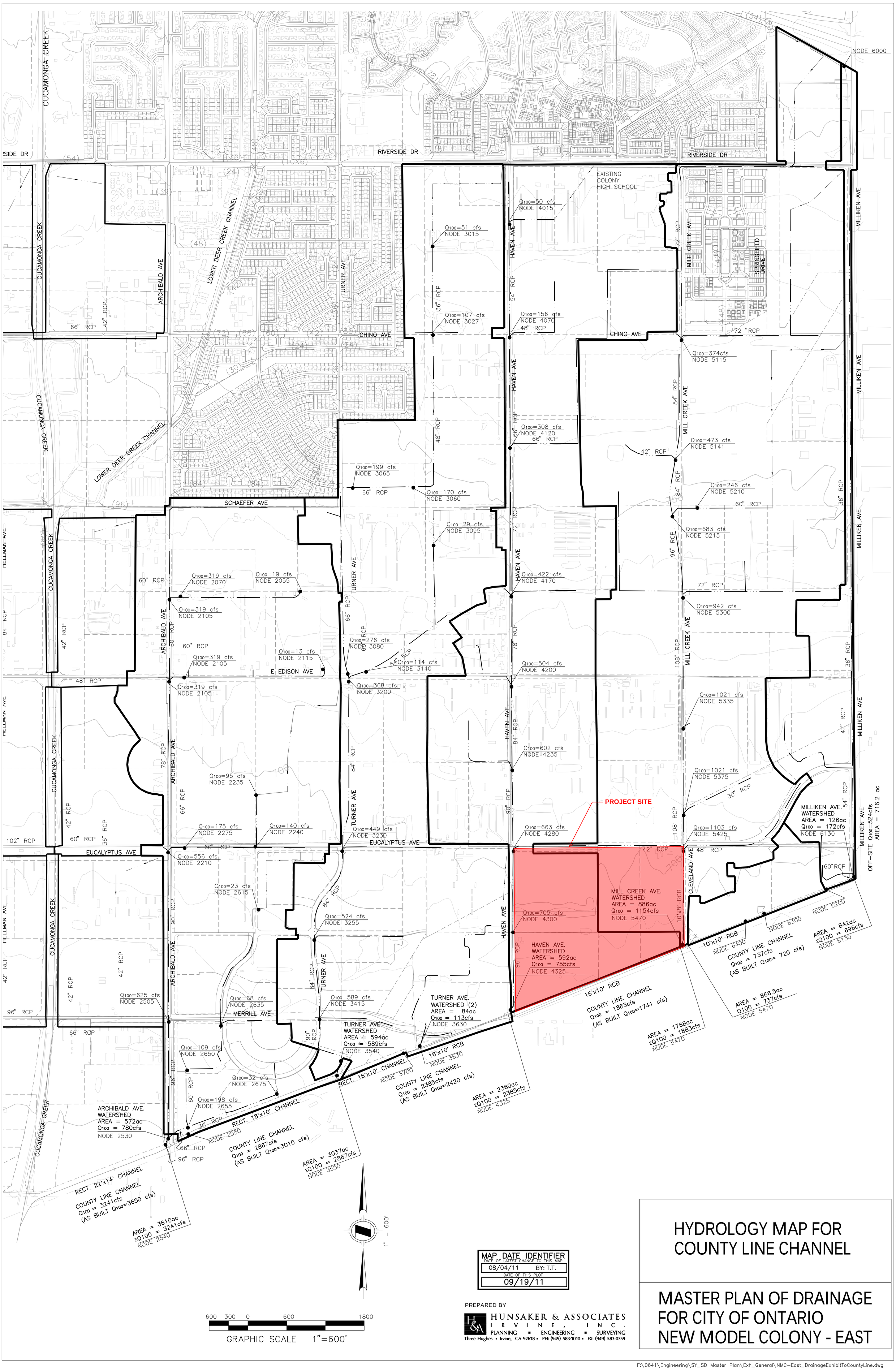
TW of 669.16' used for Q3 analysis of County line

WATER SURFACE PROFILE LISTING

Date: 8- 4-2011 Time: 8:46:59

W.O. #915-1T, ONTARIO MASTER PLAN OF DRAINAGE
100-YR STUDY, COUNTY LINE CHANNEL
LAKE AREAS TO HAVEN & MILL CREEK

Station / L/Elem	Invert Elev / Ch Slope	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head / SF Ave	Energy Grd.El. / HF	Super Elev / SE Dpth	Critical Depth / Froude N	Flow Top Width / Norm Dp	Height/ Dia.-FT / "N"	Base Wt or I.D. / X-Fall	ZL / ZR	No Wth Prs/Pip / Type Ch
8619.330	660.540	12.583	673.123	1883.20	11.77	2.15	675.27	.00	7.55	16.00	10.000	16.000	.00	0 .0
2832.670	.0027					.0027	7.78	12.58	.66	8.30	.014	.00	.00	BOX
11452.000	668.300	12.606	680.906	1883.20	11.77	2.15	683.06	.00	7.55	16.00	10.000	16.000	.00	0 .0
JUNCT STR	.0027					.0014	.05	12.61	.66		.014	.00	.00	BOX
11485.000	668.390	13.893	682.283	736.90	7.37	.84	683.13	.00	5.52	10.00	10.000	10.000	.00	0 .0
2792.000	.0027					.0014	3.97	13.89	.41	6.60	.014	.00	.00	BOX
14277.000	676.040	10.209	686.249	736.90	7.37	.84	687.09	.00	5.52	10.00	10.000	10.000	.00	0 .0
JUNCT STR	.0028					.0014	.03	10.21	.41		.014	.00	.00	BOX
14295.000	676.090	9.363	685.453	524.00	10.48	1.71	687.16	.00	4.40	10.00	5.000	10.000	.00	0 .0
125.000	.0027					.0049	.62	9.36	.83	5.00	.014	.00	.00	BOX
14420.000	676.430	9.640	686.070	524.00	10.48	1.71	687.78	.00	4.40	10.00	5.000	10.000	.00	0 .0



MAP DATE IDENTIFIER
DATE OF LATEST CHANGE TO THIS MAP
08/04/11 BY: T.T.
DATE OF THIS PLOT
09/19/11

PREPARED BY

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

HYDROLOGY MAP FOR COUNTY LINE CHANNEL

MASTER PLAN OF DRAINAGE FOR CITY OF ONTARIO NEW MODEL COLONY - EAST

WO: 0915-1T BIN: RM: DOC:
MASTER PLAN OF DRAINAGE FOR CITY OF ONTARIO - NEW MODEL COLONY - EAST

F:\0641\Engineering\SY_SD Master Plan\Exh_General\NMC-East_DrainageExhibitToCountyLine.dwg

Appendix E – USDA NRCS NCSS Soil Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for San Bernardino County Southwestern Part, California, and Western Riverside Area, California

April 22, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

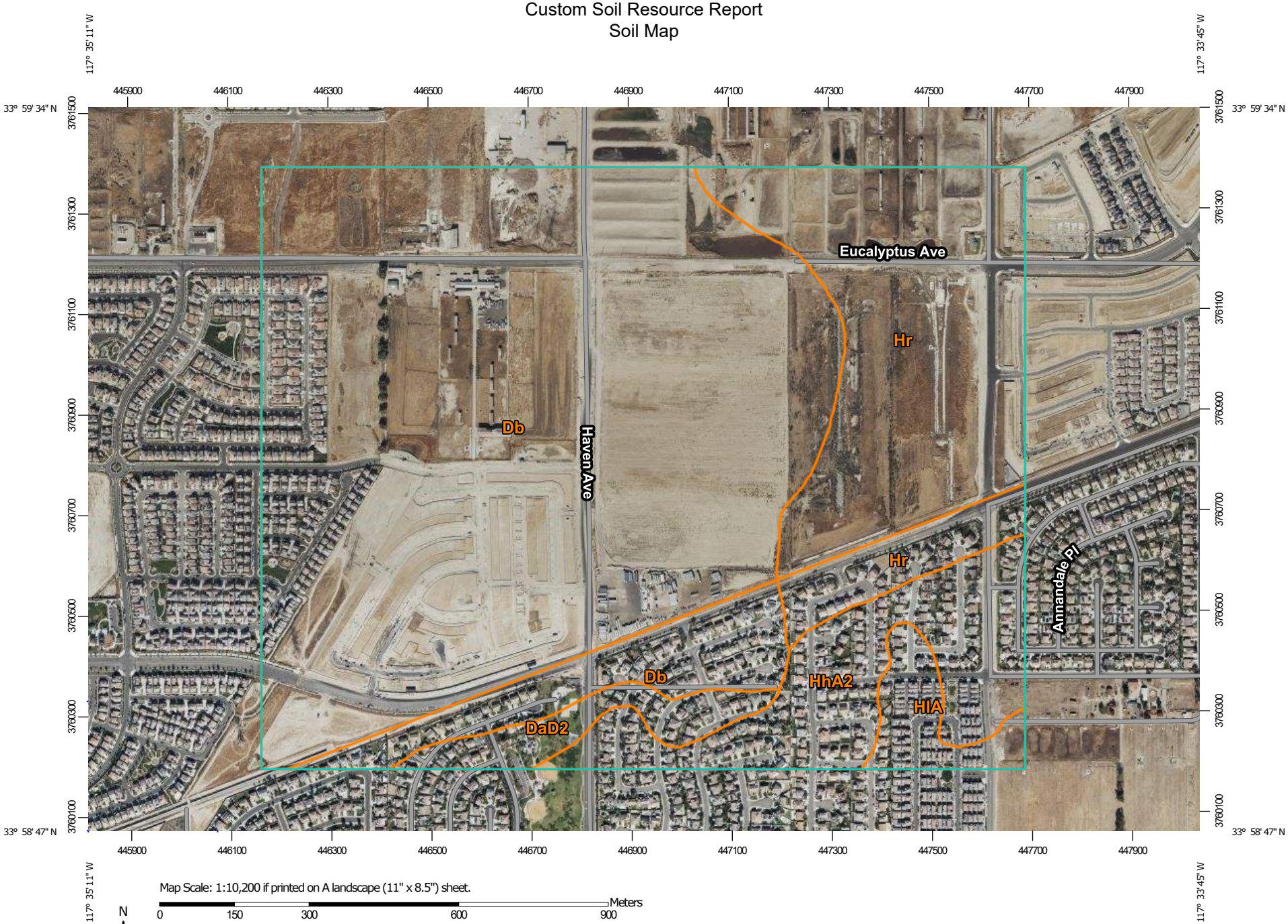
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:10,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 450 900 1800 2700

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:15,800 to 1:24,000.

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: San Bernardino County Southwestern Part, California
Survey Area Data: Version 13, Sep 13, 2021

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Nov 15, 2020—Dec 5, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Db	Delhi fine sand	269.0	59.3%
Hr	Hilmar loamy fine sand	80.6	17.8%
Subtotals for Soil Survey Area		**349.5**	**77.1%**
Totals for Area of Interest		**453.3**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DaD2	Delhi fine sand, 2 to 15 percent slopes, wind-eroded	12.7	2.8%
Db	Delhi fine sand	24.4	5.4%
HhA2	Hilmar loamy sand, 0 to 2 percent slopes, eroded	42.5	9.4%
HlA	Hilmar loamy very fine sand, 0 to 2 percent slopes	11.0	2.4%
Hr	Hilmar loamy fine sand	13.2	2.9%
Subtotals for Soil Survey Area		**103.7**	**22.9%**
Totals for Area of Interest		**453.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the

scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

San Bernardino County Southwestern Part, California

Db—Delhi fine sand

Map Unit Setting

National map unit symbol: hcjq
Elevation: 30 to 1,400 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Delhi and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Delhi

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from granite

Typical profile

H1 - 0 to 18 inches: fine sand
H2 - 18 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R019XG912CA - Sandy Fan
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Tujunga, loamy sand
Percent of map unit: 5 percent
Hydric soil rating: No

Hr—Hilmar loamy fine sand

Map Unit Setting
National map unit symbol: hck6
Elevation: 540 to 890 feet
Mean annual precipitation: 11 to 15 inches
Mean annual air temperature: 63 to 65 degrees F
Frost-free period: 320 to 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Hilmar and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hilmar

Setting
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile
A - 0 to 13 inches: loamy fine sand
C1 - 13 to 16 inches: loamy sand
C2 - 16 to 23 inches: loamy sand
2C - 23 to 60 inches: stratified loam to sandy loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent

Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B
Ecological site: R019XG911CA - Loamy Fan
Hydric soil rating: No

Minor Components

Delhi

Percent of map unit: 10 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Tujunga, loamy sand

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Western Riverside Area, California

DaD2—Delhi fine sand, 2 to 15 percent slopes, wind-eroded

Map Unit Setting

National map unit symbol: hcsx
Elevation: 200 to 1,400 feet
Mean annual precipitation: 13 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Delhi and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Delhi

Setting

Landform: Dunes, alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Wind modified alluvium derived from granite

Typical profile

H1 - 0 to 10 inches: fine sand
H2 - 10 to 48 inches: sand
H3 - 48 to 60 inches: fine sandy loam

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R019XD035CA - SANDY (1975)
Hydric soil rating: No

Minor Components

Hilmar

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent
Hydric soil rating: No

Tujunga

Percent of map unit: 5 percent
Hydric soil rating: No

Db—Delhi fine sand

Map Unit Setting

National map unit symbol: sgq6
Elevation: 30 to 1,400 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 225 to 310 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Delhi and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Delhi

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from granite

Typical profile

H1 - 0 to 18 inches: fine sand
H2 - 18 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R019XG912CA - Sandy Fan
Hydric soil rating: No

Minor Components

Unnamed
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Tujunga, loamy sand
Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed
Percent of map unit: 5 percent
Hydric soil rating: No

HhA2—Hilmar loamy sand, 0 to 2 percent slopes, eroded

Map Unit Setting
National map unit symbol: hcw8
Elevation: 300 to 900 feet
Mean annual precipitation: 11 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Hilmar and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hilmar

Setting
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile
H1 - 0 to 16 inches: loamy sand
H2 - 16 to 22 inches: stratified very fine sandy loam to silt loam
H3 - 22 to 72 inches: stratified very fine sandy loam to silt loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 50.0
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R019XD035CA - SANDY (1975)
Hydric soil rating: No

Minor Components

Tujunga

Percent of map unit: 5 percent
Hydric soil rating: No

Delhi

Percent of map unit: 5 percent
Hydric soil rating: No

Chino

Percent of map unit: 5 percent
Hydric soil rating: No

HIA—Hilmar loamy very fine sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hcw9
Elevation: 10 to 20 feet
Mean annual precipitation: 8 to 15 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 250 to 260 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Hilmar and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hilmar

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 16 inches: loamy fine sand
H2 - 16 to 72 inches: loamy fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 50.0
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: R019XD035CA - SANDY (1975)
Hydric soil rating: No

Minor Components

Delhi

Percent of map unit: 5 percent
Hydric soil rating: No

Chino

Percent of map unit: 5 percent
Hydric soil rating: No

Tujunga

Percent of map unit: 5 percent
Hydric soil rating: No

Hr—Hilmar loamy fine sand

Map Unit Setting

National map unit symbol: sgq5
Elevation: 10 to 2,500 feet
Mean annual precipitation: 10 to 25 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 225 to 350 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Hilmar and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hilmar

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

A - 0 to 13 inches: loamy fine sand
C1 - 13 to 16 inches: loamy sand
C2 - 16 to 23 inches: loamy sand
2C3 - 23 to 60 inches: stratified loamy sand to loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Ecological site: R019XG911CA - Loamy Fan
Hydric soil rating: No

Minor Components

Delhi

Percent of map unit: 10 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Tujunga, loamy sand

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

References

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

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf