APPENDIX 1

WITH A PORTION OF SECTION 5

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SECTION 4

EXISTING CONDITION HYDROLOGY CALCULATIONS

EXPECTED VALUE (EV) & HIGH CONFIDENCE (HC)

2-YR, 5-YR, 10-YR, 25-YR, 50-YR & 100-YR

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**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "A", 2-YEAR STORM EXPECTED VALUE     *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 **************************************************************************

  FILE NAME: XA-2YR.DAT
  TIME/DATE OF STUDY: 18:13 01/03/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
   1)    5.00;  1.600
   2)   10.00;  1.060
   3)   15.00;  0.840
   4)   20.00;  0.720
   5)   25.00;  0.630
   6)   30.00;  0.560
   7)   40.00;  0.480
   8)   50.00;  0.420
   9)   60.00;  0.365
  10)   90.00;  0.300
  11)  120.00;  0.245
  12)  180.00;  0.190
  13)  360.00;  0.135
  14) 1200.00;  0.080
  *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   45.0     40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1132.30  DOWNSTREAM(FEET) =   1088.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.148
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.053
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        2.00      0.60      1.000     0   10.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.82
  TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      0.82

**************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1088.30  DOWNSTREAM(FEET) =   1077.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0286
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.82
  FLOW VELOCITY(FEET/SEC) =   2.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.55   Tc(MIN.) =   12.70
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     688.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   12.70
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.941
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        4.60      0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.60      SUBAREA RUNOFF(CFS) =     1.41
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       6.6       PEAK FLOW RATE(CFS) =       2.03

**************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
--------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1077.20  DOWNSTREAM(FEET) =  1073.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.06
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.03
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   12.96
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.96
  RAINFALL INTENSITY(INCH/HR) =   0.93
  AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.60
  TOTAL STREAM AREA(ACRES) =       6.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.03

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   14.35   RAINFALL INTENSITY(INCH/HR) =  0.87
  EFFECTIVE AREA(ACRES) =    54.48
  TOTAL AREA(ACRES) =   151.43         PEAK FLOW RATE(CFS) =    168.97
  AREA-AVERAGED Fm(INCH/HR) =   0.30  AREA-AVERAGED Fp(INCH/HR) =   0.60
  AREA-AVERAGED Ap =  0.50
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   14.35
  RAINFALL INTENSITY(INCH/HR) =   0.87
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      54.48
  TOTAL STREAM AREA(ACRES) =     151.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     168.97

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
    1        2.03   12.96    0.930  0.60( 0.60) 1.00       6.6      300.00
    2      168.97   14.35    0.869  0.60( 0.30) 0.50      54.5      303.00

  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      171.00   12.96    0.930  0.60( 0.34) 0.56      55.8      300.00
    2      170.62   14.35    0.869  0.60( 0.33) 0.55      61.1      303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     171.00    Tc(MIN.) =    12.96
  EFFECTIVE AREA(ACRES) =      55.82   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =     158.0
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.00  DOWNSTREAM(FEET) =  1056.00
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  29.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.74
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     171.00
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   13.10
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =    1031.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   13.10
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.924
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.30      0.60      0.100     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     0.23
  EFFECTIVE AREA(ACRES) =     56.12   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =      158.3       PEAK FLOW RATE(CFS) =     171.00
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1056.00  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  36.91
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     171.00
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   13.12
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    307.00 =    1071.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.12
  RAINFALL INTENSITY(INCH/HR) =   0.92
  AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =      56.12
  TOTAL STREAM AREA(ACRES) =     158.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     171.00

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1103.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.756
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.194
  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.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.80      0.60      1.000     0    8.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.43
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      0.43

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1103.00  DOWNSTREAM(FEET) =   1067.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   644.00   CHANNEL SLOPE =  0.0548
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.002
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        3.40      0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.06
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.17
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   2.57
  Tc(MIN.) =   11.33
  SUBAREA AREA(ACRES) =     3.40    SUBAREA RUNOFF(CFS) =    1.23
  EFFECTIVE AREA(ACRES) =     4.20    AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      4.2        PEAK FLOW RATE(CFS) =      1.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   4.72
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =     944.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1067.70  DOWNSTREAM(FEET) =   1052.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0177
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.834
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        4.70      0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.77
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   3.92
  Tc(MIN.) =   15.25
  SUBAREA AREA(ACRES) =     4.70    SUBAREA RUNOFF(CFS) =    0.99
  EFFECTIVE AREA(ACRES) =     8.90    AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      8.9        PEAK FLOW RATE(CFS) =      1.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   3.68
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    311.00 =    1831.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.834
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.70      0.60      1.000     -
```

```
  USER-DEFINED                -       11.50      0.60      1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.20      SUBAREA RUNOFF(CFS) =    2.57
  EFFECTIVE AREA(ACRES) =     21.10   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       21.1       PEAK FLOW RATE(CFS) =       4.45

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1051.10  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.26
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.45
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   15.64
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   15.64
  RAINFALL INTENSITY(INCH/HR) =   0.82
  AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      21.10
  TOTAL STREAM AREA(ACRES) =      21.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.45

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      171.00   13.12    0.923  0.60( 0.33) 0.56      56.1     300.00
      1      170.62   14.51    0.862  0.60( 0.33) 0.55      61.4     303.00
      2        4.45   15.64    0.825  0.60( 0.60) 1.00      21.1     308.00

  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      175.44   13.12    0.923  0.60( 0.40) 0.66      73.8     300.00
      2      175.07   14.51    0.862  0.60( 0.40) 0.66      81.0     303.00
      3      163.13   15.64    0.825  0.60( 0.40) 0.67      82.5     308.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     175.44    Tc(MIN.) =    13.12

  EFFECTIVE AREA(ACRES) =      73.82   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =      179.4
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1050.00  DOWNSTREAM(FEET) =  1025.50
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.46
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     175.44
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   13.37
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.37
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.912
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.80      0.60      0.100     -
  USER-DEFINED                -        2.40      0.60      0.600     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =    3.20      SUBAREA RUNOFF(CFS) =    1.80
  EFFECTIVE AREA(ACRES) =     77.02   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =      182.6       PEAK FLOW RATE(CFS) =     175.44
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.37
  RAINFALL INTENSITY(INCH/HR) =   0.91
  AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  0.66
  EFFECTIVE STREAM AREA(ACRES) =      77.02
  TOTAL STREAM AREA(ACRES) =     182.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     175.44

****************************************************************************
  FLOW PROCESS FROM NODE    333.10 TO NODE    333.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

EXISTING CONDITION, DRAINAGE AREA "A"
2-YEAR STORM, EXPECTED VALUE

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1144.00  DOWNSTREAM(FEET) =   1094.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.892
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.072
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.00      0.60      1.000     0    9.89
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      0.42

********************************************************************************
  FLOW PROCESS FROM NODE    333.11 TO NODE    333.20 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1094.00  DOWNSTREAM(FEET) =   1075.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   275.00   CHANNEL SLOPE =  0.0684
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.42
  FLOW VELOCITY(FEET/SEC) =   3.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =   11.06
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.20 =     575.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    333.20 TO NODE    333.20 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.06
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.013
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        5.50      0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =     2.05
  EFFECTIVE AREA(ACRES) =      6.50   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.5       PEAK FLOW RATE(CFS) =       2.42

********************************************************************************
  FLOW PROCESS FROM NODE    333.20 TO NODE    333.30 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1075.20  DOWNSTREAM(FEET) =   1032.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   135.00   CHANNEL SLOPE =  0.3200
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.42
  FLOW VELOCITY(FEET/SEC.) =  15.15   FLOW DEPTH(FEET) =   0.40
  TRAVEL TIME(MIN.) =   0.15   Tc(MIN.) =   11.21
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.30 =     710.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    333.30 TO NODE    333.00 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1032.00  DOWNSTREAM ELEVATION(FEET) = 1027.00
  STREET LENGTH(FEET) =   123.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.54
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.18
  STREET FLOW TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =   11.72
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.984
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.60      0.60      0.100     -
  USER-DEFINED                -        0.60      0.60      0.850     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     0.76
  EFFECTIVE AREA(ACRES) =      7.70    AREA-AVERAGED Fm(INCH/HR) =  0.55
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =       3.00

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.85
  FLOW VELOCITY(FEET/SEC.) =  4.04   DEPTH*VELOCITY(FT*FT/SEC.) =   1.22
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.00 =     833.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   11.72
  RAINFALL INTENSITY(INCH/HR) =   0.98
  AREA-AVERAGED Fm(INCH/HR) =  0.55
```

EXISTING CONDITION, DRAINAGE AREA "A"
2-YEAR STORM, EXPECTED VALUE

```
 AREA-AVERAGED Fp(INCH/HR) =  0.60
 AREA-AVERAGED Ap =  0.92
 EFFECTIVE STREAM AREA(ACRES) =        7.70
 TOTAL STREAM AREA(ACRES) =        7.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        3.00

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      175.44   13.37    0.912  0.60( 0.39) 0.66       77.0     300.00
     1      175.07   14.76    0.851  0.60( 0.39) 0.65       84.2     303.00
     1      163.13   15.90    0.818  0.60( 0.40) 0.66       85.7     308.00
     2        3.00   11.72    0.984  0.60( 0.55) 0.92        7.7     333.10

 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      178.33   11.72    0.984  0.60( 0.41) 0.68       75.2     333.10
     2      177.94   13.37    0.912  0.60( 0.41) 0.68       84.7     300.00
     3      177.15   14.76    0.851  0.60( 0.41) 0.68       91.9     303.00
     4      164.98   15.90    0.818  0.60( 0.41) 0.68       93.4     308.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     178.33    Tc(MIN.) =    11.72
 EFFECTIVE AREA(ACRES) =      75.22   AREA-AVERAGED Fm(INCH/HR) =  0.41
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.68
 TOTAL AREA(ACRES) =      190.3
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1025.50  DOWNSTREAM(FEET) =  1024.00
 FLOW LENGTH(FEET) =   109.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.07
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     178.33
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   11.84
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.84
 RAINFALL INTENSITY(INCH/HR) =   0.98
 AREA-AVERAGED Fm(INCH/HR) =  0.41
 AREA-AVERAGED Fp(INCH/HR) =  0.60
 AREA-AVERAGED Ap =  0.68
 EFFECTIVE STREAM AREA(ACRES) =      75.22
 TOTAL STREAM AREA(ACRES) =     190.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     178.33

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    335.11 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   243.00
 ELEVATION DATA: UPSTREAM(FEET) =   1077.80  DOWNSTREAM(FEET) =   1075.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.680
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.419
 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                 -        0.20      0.60      0.100     0    6.68
 PUBLIC PARK                -        0.20      0.60      0.850     0   10.61
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA RUNOFF(CFS) =      0.41
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.41

****************************************************************************
 FLOW PROCESS FROM NODE    335.11 TO NODE    335.10 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1075.00  DOWNSTREAM ELEVATION(FEET) = 1070.00
 STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.90
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =    3.83
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.77
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.64
 STREET FLOW TRAVEL TIME(MIN.) =   1.30   Tc(MIN.) =    7.98
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.279
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.20      0.60      0.100     -
 USER-DEFINED               -        1.10      0.60      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.735
 SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    0.98
```

EXISTING CONDITION, DRAINAGE AREA "A"
2-YEAR STORM, EXPECTED VALUE

```
  EFFECTIVE AREA(ACRES) =       1.70    AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.67
  TOTAL AREA(ACRES) =         1.7         PEAK FLOW RATE(CFS) =        1.34

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   5.59
  FLOW VELOCITY(FEET/SEC.) =  2.83   DEPTH*VELOCITY(FT*FT/SEC.) =   0.74
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.10 =     458.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.10 TO NODE    335.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1070.00  DOWNSTREAM ELEVATION(FEET) = 1048.00
  STREET LENGTH(FEET) =   588.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.98
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    6.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.62
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.99
  STREET FLOW TRAVEL TIME(MIN.) =   2.71   Tc(MIN.) =   10.69
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.030
  SUBAREA LOSS RATE DATA(AMC   II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.60      0.60      0.100     -
  USER-DEFINED                -        1.60      0.60      0.850     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
  SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    1.27
  EFFECTIVE AREA(ACRES) =      3.90    AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        3.9         PEAK FLOW RATE(CFS) =        2.23

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   6.76
  FLOW VELOCITY(FEET/SEC.) =  3.71   DEPTH*VELOCITY(FT*FT/SEC.) =   1.05
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.20 =    1046.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.20 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1048.00  DOWNSTREAM(FEET) =  1024.00
  FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.00
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.23
  PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =   11.71
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    336.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.71
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.985
  SUBAREA LOSS RATE DATA(AMC   II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.30      0.60      0.100     -
  USER-DEFINED                -        0.10      0.60      0.850     -
  USER-DEFINED                -        1.50      0.60      0.100     -
  USER-DEFINED                -        1.50      0.60      0.850     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.453
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    2.18
  EFFECTIVE AREA(ACRES) =      7.30    AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =        7.3         PEAK FLOW RATE(CFS) =        4.25

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   11.71
  RAINFALL INTENSITY(INCH/HR) =   0.98
  AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =       7.30
  TOTAL STREAM AREA(ACRES) =       7.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.25

  ** CONFLUENCE DATA **
   STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)    NODE
      1      178.33    11.84     0.979  0.60( 0.41) 0.68       75.2     333.10
      1      177.94    13.49     0.906  0.60( 0.41) 0.68       84.7     300.00
      1      177.15    14.88     0.845  0.60( 0.41) 0.68       91.9     303.00
      1      164.98    16.02     0.816  0.60( 0.41) 0.68       93.4     308.00
      2        4.25    11.71     0.985  0.60( 0.34) 0.56        7.3     335.00

  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      182.39   11.71     0.985  0.60( 0.40) 0.67      81.7      335.00
    2      182.55   11.84     0.979  0.60( 0.40) 0.67      82.5      333.10
    3      181.68   13.49     0.906  0.60( 0.40) 0.67      92.0      300.00
    4      180.48   14.88     0.845  0.60( 0.40) 0.67      99.2      303.00
    5      168.12   16.02     0.816  0.60( 0.40) 0.67     100.7      308.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     182.55    Tc(MIN.) =    11.84
 EFFECTIVE AREA(ACRES) =      82.52   AREA-AVERAGED Fm(INCH/HR) =  0.40
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      197.6
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1024.00  DOWNSTREAM(FEET) =   895.30
 FLOW LENGTH(FEET) =   549.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  43.73
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     182.55
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   12.05
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.05
 RAINFALL INTENSITY(INCH/HR) =   0.97
 AREA-AVERAGED Fm(INCH/HR) =  0.40
 AREA-AVERAGED Fp(INCH/HR) =  0.60
 AREA-AVERAGED Ap =  0.67
 EFFECTIVE STREAM AREA(ACRES) =      82.52
 TOTAL STREAM AREA(ACRES) =     197.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     182.55

****************************************************************************
 FLOW PROCESS FROM NODE    373.00 TO NODE    373.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =   1018.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.657
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.987
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                 -        1.20      0.60      1.000     0   11.66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.42
 TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      0.42

****************************************************************************
 FLOW PROCESS FROM NODE    373.10 TO NODE    374.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1018.00  DOWNSTREAM(FEET) =    895.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.3098
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.961
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                 -        1.80      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.71
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.96
 AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   0.60
 Tc(MIN.) =   12.26
 SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    0.58
 EFFECTIVE AREA(ACRES) =      3.00     AREA-AVERAGED Fm(INCH/HR) =   0.60
 AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      3.0         PEAK FLOW RATE(CFS) =       0.97

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =  11.98
 LONGEST FLOWPATH FROM NODE    373.00 TO NODE    374.00 =     696.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.26
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.961
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                 -        7.30      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.30      SUBAREA RUNOFF(CFS) =    2.37
 EFFECTIVE AREA(ACRES) =     10.30   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      10.3        PEAK FLOW RATE(CFS) =       3.34

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   12.26
  RAINFALL INTENSITY(INCH/HR) =   0.96
  AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      10.30
  TOTAL STREAM AREA(ACRES) =      10.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.34

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      182.39   11.92    0.976  0.60( 0.40) 0.67      81.7     335.00
      1      182.55   12.05    0.970  0.60( 0.40) 0.67      82.5     333.10
      1      181.68   13.70    0.897  0.60( 0.40) 0.67      92.0     300.00
      1      180.48   15.09    0.838  0.60( 0.40) 0.67      99.2     303.00
      1      168.12   16.23    0.810  0.60( 0.40) 0.67     100.7     308.00
      2        3.34   12.26    0.961  0.60( 0.60) 1.00      10.3     373.00

  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      185.73   11.92    0.976  0.60( 0.42) 0.71      91.7     335.00
      2      185.89   12.05    0.970  0.60( 0.42) 0.71      92.6     333.10
      3      185.78   12.26    0.961  0.60( 0.42) 0.71      94.0     373.00
      4      184.44   13.70    0.897  0.60( 0.42) 0.70     102.3     300.00
      5      182.69   15.09    0.838  0.60( 0.42) 0.70     109.5     303.00
      6      170.08   16.23    0.810  0.60( 0.42) 0.70     111.0     308.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     185.89    Tc(MIN.) =    12.05
  EFFECTIVE AREA(ACRES) =      92.65   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.71
  TOTAL AREA(ACRES) =      207.9
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    377.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   895.30  DOWNSTREAM(FEET) =   890.00
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.80
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     185.89
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   12.19
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.19
  RAINFALL INTENSITY(INCH/HR) =   0.96
  AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  0.71
  EFFECTIVE STREAM AREA(ACRES) =      92.65
  TOTAL STREAM AREA(ACRES) =     207.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     185.89

****************************************************************************
  FLOW PROCESS FROM NODE    375.00 TO NODE    376.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1140.00  DOWNSTREAM(FEET) =   1036.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.544
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.217
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.30      0.60      1.000     0    8.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      0.72

****************************************************************************
  FLOW PROCESS FROM NODE    376.00 TO NODE    377.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1036.00  DOWNSTREAM(FEET) =    882.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.2034
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.72
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.66   Tc(MIN.) =   11.20
  LONGEST FLOWPATH FROM NODE    375.00 TO NODE    377.00 =    1057.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.20
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.007
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
```

```
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                 -       4.70      0.60       1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =     1.72
EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.60
AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       6.0      PEAK FLOW RATE(CFS) =       2.20

****************************************************************************
FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   11.20
RAINFALL INTENSITY(INCH/HR) =   1.01
AREA-AVERAGED Fm(INCH/HR) =  0.60
AREA-AVERAGED Fp(INCH/HR) =  0.60
AREA-AVERAGED Ap =  1.00
EFFECTIVE STREAM AREA(ACRES) =       6.00
TOTAL STREAM AREA(ACRES) =       6.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.20

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      185.73   12.05    0.970  0.60( 0.42) 0.71      91.7     335.00
    1      185.89   12.19    0.964  0.60( 0.42) 0.71      92.6     333.10
    1      185.78   12.40    0.955  0.60( 0.42) 0.71      94.0     373.00
    1      184.44   13.84    0.891  0.60( 0.42) 0.70     102.3     300.00
    1      182.69   15.22    0.835  0.60( 0.42) 0.70     109.5     303.00
    1      170.08   16.37    0.807  0.60( 0.42) 0.70     111.0     308.00
    2        2.20   11.20    1.007  0.60( 0.60) 1.00       6.0     375.00

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      186.68   11.20    1.007  0.60( 0.44) 0.73      91.2     375.00
    2      187.73   12.05    0.970  0.60( 0.44) 0.73      97.7     335.00
    3      187.85   12.19    0.964  0.60( 0.44) 0.73      98.6     333.10
    4      187.70   12.40    0.955  0.60( 0.43) 0.72     100.0     373.00
    5      186.01   13.84    0.891  0.60( 0.43) 0.72     108.3     300.00
    6      183.96   15.22    0.835  0.60( 0.43) 0.71     115.5     303.00
    7      171.20   16.37    0.807  0.60( 0.43) 0.72     117.0     308.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     187.85    Tc(MIN.) =    12.19
EFFECTIVE AREA(ACRES) =      98.65   AREA-AVERAGED Fm(INCH/HR) =  0.44
AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.73
TOTAL AREA(ACRES) =      213.9
LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    381.00 TO NODE    382.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
ELEVATION DATA: UPSTREAM(FEET) =    992.00  DOWNSTREAM(FEET) =    914.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.163
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"                 -       0.20      0.60      1.000     0    9.05
NATURAL FAIR COVER
"OPEN BRUSH"                 -       1.10      0.60      1.000     0    9.05
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      0.66
TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      0.66

****************************************************************************
FLOW PROCESS FROM NODE    383.10 TO NODE    383.20 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
ELEVATION DATA: UPSTREAM(FEET) =   1022.00  DOWNSTREAM(FEET) =   1008.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.730
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.197
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                  -       0.50      0.60      0.850     0    8.73
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
SUBAREA RUNOFF(CFS) =      0.31
TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      0.31

****************************************************************************
FLOW PROCESS FROM NODE    383.20 TO NODE    383.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1008.00  DOWNSTREAM(FEET) =    988.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   347.00   CHANNEL SLOPE =  0.0576
CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    1.000
MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    2.00
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.109
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                 -       2.00      0.60      0.850     -
USER-DEFINED                 -       2.40      0.60      0.850     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.50
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.08
  AVERAGE FLOW DEPTH(FEET) =   0.46   TRAVEL TIME(MIN.) =   0.82
  Tc(MIN.) =    9.55
  SUBAREA AREA(ACRES) =     4.40       SUBAREA RUNOFF(CFS) =    2.37
  EFFECTIVE AREA(ACRES) =     4.90     AREA-AVERAGED Fm(INCH/HR) =   0.51
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   0.85
  TOTAL AREA(ACRES) =       4.9         PEAK FLOW RATE(CFS) =       2.64

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.57   FLOW VELOCITY(FEET/SEC.) =   8.15
  LONGEST FLOWPATH FROM NODE    383.10 TO NODE    383.00 =     647.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    384.10 TO NODE    384.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =   1036.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.030
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.60      0.60      1.000      0   10.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.23
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      0.23

****************************************************************************
  FLOW PROCESS FROM NODE    385.10 TO NODE    385.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1105.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.896
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.179
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.00      0.60      1.000      0    8.90
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      0.52

****************************************************************************
  FLOW PROCESS FROM NODE    385.20 TO NODE    385.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    980.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   390.00   CHANNEL SLOPE =  0.3205
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.52
  FLOW VELOCITY(FEET/SEC) =   3.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.05   Tc(MIN.) =   10.95
  LONGEST FLOWPATH FROM NODE    385.10 TO NODE    385.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    385.00 TO NODE    385.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.95
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.018
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.30      0.60      1.000      -
  USER-DEFINED                -        2.30      0.60      1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.60       SUBAREA RUNOFF(CFS) =     0.98
  EFFECTIVE AREA(ACRES) =      3.60    AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.6        PEAK FLOW RATE(CFS) =       1.36
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        3.6  TC(MIN.) =     10.95
  EFFECTIVE AREA(ACRES) =      3.60  AREA-AVERAGED Fm(INCH/HR)=  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       1.36
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "A"
2-YEAR STORM, EXPECTED VALUE

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

                          HUNSAKER & ASSOCIATES
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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "B", 2-YEAR STORM EXPECTED VALUE     *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XB-2YR.DAT
  TIME/DATE OF STUDY: 19:14 01/03/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
   1)    5.00;  1.600
   2)   10.00;  1.060
   3)   15.00;  0.840
   4)   20.00;  0.720
   5)   25.00;  0.630
   6)   30.00;  0.560
   7)   40.00;  0.480
   8)   50.00;  0.420
   9)   60.00;  0.365
  10)   90.00;  0.300
  11)  120.00;  0.245
  12)  180.00;  0.190
  13)  360.00;  0.135
  14) 1200.00;  0.080
  *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

**************************************************************************
  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) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1207.00  DOWNSTREAM(FEET) =   1142.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.386
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.126
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.80      0.60      1.000     0    9.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      0.38

**************************************************************************
  FLOW PROCESS FROM NODE       2.00 TO NODE       3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1142.00  DOWNSTREAM(FEET) =   1136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE =  0.0189
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.38
  FLOW VELOCITY(FEET/SEC) =   2.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.57   Tc(MIN.) =   11.96
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     618.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.96
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.974
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.80      0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.80      SUBAREA RUNOFF(CFS) =     0.94
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.6       PEAK FLOW RATE(CFS) =       1.21

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       4.00 IS CODE =  52
--------------------------------------------------------------------------
```

```
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1136.00  DOWNSTREAM(FEET) =   1124.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0320
CHANNEL FLOW THRU SUBAREA(CFS) =       1.21
FLOW VELOCITY(FEET/SEC) =   2.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.25   Tc(MIN.) =   14.20
LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     993.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
MAINLINE Tc(MIN.) =   14.20
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.875
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        1.50      0.60      1.000     -
USER-DEFINED                -        3.50      0.60      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     5.00      SUBAREA RUNOFF(CFS) =     1.24
EFFECTIVE AREA(ACRES) =      8.60   AREA-AVERAGED Fm(INCH/HR) =  0.60
AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       8.6       PEAK FLOW RATE(CFS) =       2.13

****************************************************************************
FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1124.00  DOWNSTREAM(FEET) =   1120.60
CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0148
CHANNEL FLOW THRU SUBAREA(CFS) =       2.13
FLOW VELOCITY(FEET/SEC) =   2.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.81   Tc(MIN.) =   16.01
LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1223.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
MAINLINE Tc(MIN.) =   16.01
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.816
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        4.50      0.60      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     4.50      SUBAREA RUNOFF(CFS) =     0.87
EFFECTIVE AREA(ACRES) =     13.10   AREA-AVERAGED Fm(INCH/HR) =  0.60
AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =       2.54

****************************************************************************
FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1120.60  DOWNSTREAM(FEET) =  1052.00
FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  11.59
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       2.54
PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   16.80
LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1773.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1052.00  DOWNSTREAM(FEET) =   1009.20
CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0718
CHANNEL FLOW THRU SUBAREA(CFS) =       2.54
FLOW VELOCITY(FEET/SEC) =   4.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.05   Tc(MIN.) =   18.85
LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    2369.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
MAINLINE Tc(MIN.) =   18.85
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.748
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        0.10      0.60      1.000     -
USER-DEFINED                -        5.40      0.60      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =     0.73
EFFECTIVE AREA(ACRES) =     18.60   AREA-AVERAGED Fm(INCH/HR) =  0.60
AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       18.6       PEAK FLOW RATE(CFS) =       2.54
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   18.85
RAINFALL INTENSITY(INCH/HR) =   0.75
AREA-AVERAGED Fm(INCH/HR) =  0.60
AREA-AVERAGED Fp(INCH/HR) =  0.60
```

EXISTING CONDITION, DRAINAGE AREA "B"
2-YEAR STORM, EXPECTED VALUE

```
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      18.60
 TOTAL STREAM AREA(ACRES) =      18.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.54

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1242.00  DOWNSTREAM(FEET) =   1216.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.292
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.003
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.70      0.60      1.000     0   11.29
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.25
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      0.25

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1216.20  DOWNSTREAM(FEET) =   1188.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   460.00   CHANNEL SLOPE =  0.0613
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.25
 FLOW VELOCITY(FEET/SEC) =   3.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.06   Tc(MIN.) =   13.36
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.36
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.912
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        1.60      0.60      1.000     -
 USER-DEFINED                -        0.80      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.40      SUBAREA RUNOFF(CFS) =     0.67
 EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       3.1       PEAK FLOW RATE(CFS) =       0.87

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1188.00  DOWNSTREAM(FEET) =   1107.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.1419
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.87
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.99   Tc(MIN.) =   15.34
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1325.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.34
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.832
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        4.80      0.60      1.000     -
 USER-DEFINED                -        2.20      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.00      SUBAREA RUNOFF(CFS) =     1.46
 EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       10.1       PEAK FLOW RATE(CFS) =       2.11

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1107.80  DOWNSTREAM(FEET) =   1082.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE =  0.0956
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.11
 FLOW VELOCITY(FEET/SEC) =   5.38 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.84   Tc(MIN.) =   16.18
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.18
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.812
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        5.70      0.60      1.000     -
 USER-DEFINED                -        0.60      0.60      1.000     -
 USER-DEFINED                -        0.30      0.60      1.000     -
```

EXISTING CONDITION, DRAINAGE AREA "B"
2-YEAR STORM, EXPECTED VALUE

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     6.60      SUBAREA RUNOFF(CFS) =     1.26
  EFFECTIVE AREA(ACRES) =     16.70   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       16.7       PEAK FLOW RATE(CFS) =       3.18

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1082.00  DOWNSTREAM(FEET) =  1062.00
  FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.63
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.18
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   16.74
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1919.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1009.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   870.00   CHANNEL SLOPE =  0.0607
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.18
  FLOW VELOCITY(FEET/SEC) =   4.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.09   Tc(MIN.) =   19.83
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.83
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.724
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -       10.30      0.60      1.000     -
  USER-DEFINED                -        2.10      0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.40      SUBAREA RUNOFF(CFS) =     1.39
  EFFECTIVE AREA(ACRES) =     29.10   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       29.1       PEAK FLOW RATE(CFS) =       3.25

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   19.83
  RAINFALL INTENSITY(INCH/HR) =   0.72
  AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      29.10
  TOTAL STREAM AREA(ACRES) =      29.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.25

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1        2.54   18.85    0.748  0.60( 0.60) 1.00      18.6        1.00
      2        3.25   19.83    0.724  0.60( 0.60) 1.00      29.1        8.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1        5.80   18.85    0.748  0.60( 0.60) 1.00      46.3        1.00
      2        5.39   19.83    0.724  0.60( 0.60) 1.00      47.7        8.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.80    Tc(MIN.) =    18.85
  EFFECTIVE AREA(ACRES) =      46.26   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      47.7
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1012.00  DOWNSTREAM(FEET) =    954.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.3222
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.80
  FLOW VELOCITY(FEET/SEC.) =  11.81   FLOW DEPTH(FEET) =   0.10
  TRAVEL TIME(MIN.) =   0.25   Tc(MIN.) =   19.10
  LONGEST FLOWPATH FROM NODE      8.00 TO NODE     14.00 =    2969.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     82.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    954.00  DOWNSTREAM(FEET) =    917.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0663
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.80
  FLOW VELOCITY(FEET/SEC) =   5.63 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.65   Tc(MIN.) =   20.76
```

EXISTING CONDITION, DRAINAGE AREA "B"
2-YEAR STORM, EXPECTED VALUE

```
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     82.00 =    3527.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     82.00 TO NODE     82.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.76
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.706
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.10      0.60      1.000     -
 USER-DEFINED                -       29.30      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   29.40      SUBAREA RUNOFF(CFS) =    2.82
 EFFECTIVE AREA(ACRES) =     75.66   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       77.1       PEAK FLOW RATE(CFS) =       7.25
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       77.1  TC(MIN.) =     20.76
 EFFECTIVE AREA(ACRES) =     75.66  AREA-AVERAGED Fm(INCH/HR)=  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       7.25

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1        7.25   20.76    0.706  0.60( 0.60) 1.00       75.7        1.00
     2        6.11   21.78    0.688  0.60( 0.60) 1.00       77.1        8.00
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "B"
2-YEAR STORM, EXPECTED VALUE

```
**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "C", 2-YEAR STORM EXPECTED VALUE      *
* PORTOLLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                            *
 **************************************************************************

  FILE NAME: XC-2YR.DAT
  TIME/DATE OF STUDY: 14:05 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
   1)    5.00;  1.600
   2)   10.00;  1.060
   3)   15.00;  0.840
   4)   20.00;  0.720
   5)   25.00;  0.630
   6)   30.00;  0.560
   7)   40.00;  0.480
   8)   50.00;  0.420
   9)   60.00;  0.365
  10)   90.00;  0.300
  11)  120.00;  0.245
  12)  180.00;  0.190
  13)  360.00;  0.135
  14) 1200.00;  0.080
  *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

**************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1128.00  DOWNSTREAM(FEET) =   1050.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.163
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.40      0.60      1.000     0    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.20      0.60      1.000     0    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      0.30

**************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   295.00   CHANNEL SLOPE =  0.1695
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.30
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.04   Tc(MIN.) =   10.09
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    115.00 =     595.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   10.09
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.056
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        1.40      0.60      1.000     -
  USER-DEFINED                -        1.60      0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.00      SUBAREA RUNOFF(CFS) =    1.23
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.60
```

EXISTING CONDITION, DRAINAGE AREA "C"
2-YEAR STORM, EXPECTED VALUE

```
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.6       PEAK FLOW RATE(CFS) =       1.48

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    870.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1055.00   CHANNEL SLOPE =  0.1232
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.48
  FLOW VELOCITY(FEET/SEC) =   5.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.44   Tc(MIN.) =   13.52
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    116.00 =    1650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.905
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.40      0.60      1.000     -
  USER-DEFINED                -       13.20      0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.60      SUBAREA RUNOFF(CFS) =    3.73
  EFFECTIVE AREA(ACRES) =     17.20   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       17.2       PEAK FLOW RATE(CFS) =       4.72
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       17.2  TC(MIN.) =     13.52
  EFFECTIVE AREA(ACRES) =     17.20  AREA-AVERAGED Fm(INCH/HR)=  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       4.72
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "C"
2-YEAR STORM, EXPECTED VALUE

```
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                        Planning * Engineering * Surveying
                Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "D", 2-YEAR STORM EXPECTED VALUE      *
* PORTOLLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                            *
 **************************************************************************

  FILE NAME: XD-2YR.DAT
  TIME/DATE OF STUDY: 18:44 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                      --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
   1)    5.00;  1.600
   2)   10.00;  1.060
   3)   15.00;  0.840
   4)   20.00;  0.720
   5)   25.00;  0.630
   6)   30.00;  0.560
   7)   40.00;  0.480
   8)   50.00;  0.420
   9)   60.00;  0.365
  10)   90.00;  0.300
  11)  120.00;  0.245
  12)  180.00;  0.190
  13)  360.00;  0.135
  14) 1200.00;  0.080
  *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

**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1030.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.611
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.210
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.90      0.60      1.000     0    8.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.49
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      0.49

**************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1030.00  DOWNSTREAM(FEET) =    990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.1619
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.49
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =    9.48
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     547.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    9.48
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.116
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.30      0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.30      SUBAREA RUNOFF(CFS) =     1.07
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.2       PEAK FLOW RATE(CFS) =       1.49

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.10 IS CODE =  52
```

```
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
 ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    950.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.1250
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.49
 FLOW VELOCITY(FEET/SEC) =   5.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.04   Tc(MIN.) =   10.52
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.10 =     867.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    202.10 TO NODE    202.10 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.52
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.037
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        2.20      0.60      1.000     -
 USER-DEFINED               -        0.40      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     1.02
 EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       5.8       PEAK FLOW RATE(CFS) =       2.28

****************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1057.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.171
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.150
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               -        0.70      0.60      1.000     0    9.17
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.35
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
 FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1057.00  DOWNSTREAM(FEET) =   1026.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE =  0.2441
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.35
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.45   Tc(MIN.) =    9.62
 LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.10 =     427.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    204.10 TO NODE    204.10 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.62
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.101
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.40      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     0.18
 EFFECTIVE AREA(ACRES) =      1.10   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       1.1       PEAK FLOW RATE(CFS) =       0.50

****************************************************************************
 FLOW PROCESS FROM NODE    204.10 TO NODE    204.20 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1026.00  DOWNSTREAM(FEET) =    950.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   389.00   CHANNEL SLOPE =  0.1954
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.50
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.37   Tc(MIN.) =   10.98
 LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.20 =     816.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    204.20 TO NODE    204.20 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.98
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.017
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        1.40      0.60      1.000     -
 USER-DEFINED               -        0.60      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.00      SUBAREA RUNOFF(CFS) =     0.75
 EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       3.1       PEAK FLOW RATE(CFS) =       1.16
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1118.00  DOWNSTREAM(FEET) =   1062.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.096
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.80      0.60      1.000     0    9.67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.36
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      0.36

**************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    206.10 IS CODE =  52
--------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1027.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.3182
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.36
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.39   Tc(MIN.) =   10.06
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    206.10 =     410.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    206.10 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   10.06
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.058
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.50      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50   SUBAREA RUNOFF(CFS) =     0.21
 EFFECTIVE AREA(ACRES) =     1.30   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      1.3    PEAK FLOW RATE(CFS) =      0.54

**************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    207.00 IS CODE =  52
--------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1027.00  DOWNSTREAM(FEET) =    930.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   423.00   CHANNEL SLOPE =  0.2293
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.54
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.49   Tc(MIN.) =   11.54
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =     833.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   11.54
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.992
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        1.30      0.60      1.000     -
 USER-DEFINED                -        0.60      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.90   SUBAREA RUNOFF(CFS) =     0.67
 EFFECTIVE AREA(ACRES) =     3.20   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      3.2    PEAK FLOW RATE(CFS) =      1.13

**************************************************************************
 FLOW PROCESS FROM NODE    200.10 TO NODE    200.20 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1134.00  DOWNSTREAM(FEET) =   1073.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.506
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.113
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.10      0.60      1.000     0    9.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.51
 TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      0.51

**************************************************************************
 FLOW PROCESS FROM NODE    200.20 TO NODE    200.30 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1073.00  DOWNSTREAM(FEET) =    990.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.1137
 CHANNEL BASE(FEET) =     2.00   "Z" FACTOR =   1.000
```

EXISTING CONDITION, DRAINAGE AREA "D"
2-YEAR STORM, EXPECTED VALUE

```
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.989
 SUBAREA LOSS RATE DATA(AMC   II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.70      0.60      1.000     -
 USER-DEFINED                -        1.80      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.95
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.77
 AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   2.11
 Tc(MIN.) =   11.61
 SUBAREA AREA(ACRES) =     2.50      SUBAREA RUNOFF(CFS) =    0.88
 EFFECTIVE AREA(ACRES) =     3.60    AREA-AVERAGED Fm(INCH/HR) =   0.60
 AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       3.6       PEAK FLOW RATE(CFS) =       1.26

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   6.38
 LONGEST FLOWPATH FROM NODE    200.10 TO NODE    200.30 =    1030.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.61
 RAINFALL INTENSITY(INCH/HR) =   0.99
 AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       3.60
 TOTAL STREAM AREA(ACRES) =       3.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.26

****************************************************************************
 FLOW PROCESS FROM NODE    200.31 TO NODE    200.32 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1238.00  DOWNSTREAM(FEET) =   1204.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.030
 SUBAREA Tc AND LOSS RATE DATA(AMC   II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.40      0.60      1.000     0   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.15
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.15
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    200.32 TO NODE    200.33 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1204.00  DOWNSTREAM(FEET) =   1150.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE =  0.3253
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.15
 FLOW VELOCITY(FEET/SEC) =   3.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =   11.55
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.33 =     466.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.33 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.55
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.992
 SUBAREA LOSS RATE DATA(AMC   II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.20      0.60      1.000     -
 USER-DEFINED                -        0.30      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =    0.18
 EFFECTIVE AREA(ACRES) =      0.90   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       0.9       PEAK FLOW RATE(CFS) =       0.32

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.34 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =   1100.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   159.00   CHANNEL SLOPE =  0.3145
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.32
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.56   Tc(MIN.) =   12.11
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.34 =     625.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.34 TO NODE    200.34 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.11
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.967
 SUBAREA LOSS RATE DATA(AMC   II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.80      0.60      1.000     -
 USER-DEFINED                -        0.90      0.60      1.000     -
```

EXISTING CONDITION, DRAINAGE AREA "D"
2-YEAR STORM, EXPECTED VALUE

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.70      SUBAREA RUNOFF(CFS) =     0.56
  EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =        0.86

****************************************************************************
  FLOW PROCESS FROM NODE     200.34 TO NODE      82.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =   1085.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0791
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.86
  FLOW VELOCITY(FEET/SEC) =   4.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =   12.85
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE      82.10 =     812.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      82.10 TO NODE      82.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.85
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.935
  SUBAREA LOSS RATE DATA(AMC   II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.00      0.60      1.000     -
  USER-DEFINED                -        0.40      0.60      1.000     -
  USER-DEFINED                -        1.10      0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     3.50      SUBAREA RUNOFF(CFS) =     1.05
  EFFECTIVE AREA(ACRES) =      6.10   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =        1.84

****************************************************************************
  FLOW PROCESS FROM NODE      82.10 TO NODE     200.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1085.20  DOWNSTREAM(FEET) =   990.00
  FLOW LENGTH(FEET) =   392.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.29
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.84
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   13.34
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE     200.30 =    1204.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     200.30 TO NODE     200.30 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.) =   13.34
  RAINFALL INTENSITY(INCH/HR) =   0.91
  AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.10
  TOTAL STREAM AREA(ACRES) =       6.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.84

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1        1.26   11.61     0.989  0.60( 0.60) 1.00        3.6      200.10
      2        1.84   13.34     0.913  0.60( 0.60) 1.00        6.1      200.31

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1        3.10   11.61     0.989  0.60( 0.60) 1.00        8.9      200.10
      2        2.85   13.34     0.913  0.60( 0.60) 1.00        9.7      200.31

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.10    Tc(MIN.) =    11.61
  EFFECTIVE AREA(ACRES) =       8.91   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.7
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE     200.30 =    1204.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     200.30 TO NODE     200.40 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    970.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1250
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.10
  FLOW VELOCITY(FEET/SEC) =   5.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.45   Tc(MIN.) =   12.06
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE     200.40 =    1364.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     200.40 TO NODE     200.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.06
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.969
  SUBAREA LOSS RATE DATA(AMC   II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

EXISTING CONDITION, DRAINAGE AREA "D"
2-YEAR STORM, EXPECTED VALUE

```
  USER-DEFINED                -        0.90      0.60     1.000      -
  USER-DEFINED                -        0.20      0.60     1.000      -
  USER-DEFINED                -        0.50      0.60     1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     0.53
  EFFECTIVE AREA(ACRES) =     10.51   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.3       PEAK FLOW RATE(CFS) =       3.50

****************************************************************************
  FLOW PROCESS FROM NODE    200.40 TO NODE    200.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    970.00  DOWNSTREAM(FEET) =    949.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   156.00   CHANNEL SLOPE =  0.1346
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.50
  FLOW VELOCITY(FEET/SEC) =   6.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.42   Tc(MIN.) =   12.48
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.50 =    1520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.50 TO NODE    200.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.48
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.951
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.60      0.60     1.000      -
  USER-DEFINED                -        0.30      0.60     1.000      -
  USER-DEFINED                -        1.20      0.60     1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.10      SUBAREA RUNOFF(CFS) =     0.66
  EFFECTIVE AREA(ACRES) =     12.61   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.4       PEAK FLOW RATE(CFS) =       3.98
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       13.4  TC(MIN.) =     12.48
  EFFECTIVE AREA(ACRES) =     12.61  AREA-AVERAGED Fm(INCH/HR)=  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       3.98

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1        3.98   12.48    0.951  0.60( 0.60) 1.00       12.6     200.10
      2        3.30   14.23    0.874  0.60( 0.60) 1.00       13.4     200.31
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "D"
2-YEAR STORM, EXPECTED VALUE

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

                          HUNSAKER & ASSOCIATES
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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, AREAS "E" & "F", 2-YEAR EXPECTED VALUE             *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 **************************************************************************

  FILE NAME: X-EF-2.DAT
  TIME/DATE OF STUDY: 09:49 01/24/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
   1)    5.00;  1.600
   2)   10.00;  1.060
   3)   15.00;  0.840
   4)   20.00;  0.720
   5)   25.00;  0.630
   6)   30.00;  0.560
   7)   40.00;  0.480
   8)   50.00;  0.420
   9)   60.00;  0.365
  10)   90.00;  0.300
  11)  120.00;  0.245
  12)  180.00;  0.190
  13)  360.00;  0.135
  14) 1200.00;  0.080
  *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   45.0     40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.10 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1078.00  DOWNSTREAM(FEET) =   1072.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.509
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.437
  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                 -        0.50      0.60      0.850     0   10.34
  COMMERCIAL                  -        0.20      0.60      0.100     0    6.51
  COMMERCIAL                  -        0.20      0.60      0.100     0    6.51
  PUBLIC PARK                 -        0.10      0.60      0.850     0   10.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.550
  SUBAREA RUNOFF(CFS) =      1.00
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      1.00

**************************************************************************
  FLOW PROCESS FROM NODE    400.10 TO NODE    401.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) = 1072.00  DOWNSTREAM ELEVATION(FEET) = 1058.00
  STREET LENGTH(FEET) =   321.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    5.27
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.82
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.98
  STREET FLOW TRAVEL TIME(MIN.) =   1.40   Tc(MIN.) =    7.91
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.286
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.40      0.60      0.850     -
  USER-DEFINED                -        1.10      0.60      0.850     -
  USER-DEFINED                -        0.30      0.60      0.100     -
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
 SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =     1.38
 EFFECTIVE AREA(ACRES) =      2.80    AREA-AVERAGED Fm(INCH/HR) =  0.40
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =        2.8        PEAK FLOW RATE(CFS) =       2.24

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   6.45
 FLOW VELOCITY(FEET/SEC.) =  3.96   DEPTH*VELOCITY(FT*FT/SEC.) =   1.10
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    401.00 =     621.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1058.00  DOWNSTREAM ELEVATION(FEET) =  990.00
 STREET LENGTH(FEET) =   803.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.31
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.28
   HALFSTREET FLOOD WIDTH(FEET) =    6.68
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.58
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.57
 STREET FLOW TRAVEL TIME(MIN.) =   2.40   Tc(MIN.) =   10.31
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.046
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.60      0.60      0.500     -
 USER-DEFINED                -        0.20      0.60      0.500     -
 USER-DEFINED                -        2.20      0.60      0.850     -
 USER-DEFINED                -        0.60      0.60      0.100     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.647
 SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    2.13
 EFFECTIVE AREA(ACRES) =      6.40    AREA-AVERAGED Fm(INCH/HR) =  0.39
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.65
 TOTAL AREA(ACRES) =        6.4        PEAK FLOW RATE(CFS) =       3.77

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   7.23
 FLOW VELOCITY(FEET/SEC.) =  5.71   DEPTH*VELOCITY(FT*FT/SEC.) =   1.66
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =    1424.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.31
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.046
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.30      0.60      0.850     -
 USER-DEFINED                -        0.20      0.60      1.000     -
 USER-DEFINED                -        0.60      0.60      0.850     -
 USER-DEFINED                -        7.10      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
 SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =    3.37
 EFFECTIVE AREA(ACRES) =     14.60    AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.84
 TOTAL AREA(ACRES) =       14.6        PEAK FLOW RATE(CFS) =       7.14

****************************************************************************
 FLOW PROCESS FROM NODE    500.00 TO NODE    500.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    948.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.815
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.080
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.30      0.60      1.000     0    9.81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.56
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      0.56

****************************************************************************
 FLOW PROCESS FROM NODE    500.10 TO NODE    501.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    948.00  DOWNSTREAM(FEET) =    920.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.1000
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.56
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =   10.80
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    501.00 =     580.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 MAINLINE Tc(MIN.) =   10.80
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.025
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        1.10      0.60      1.000     -
 USER-DEFINED                -        0.70      0.60      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    0.69
 EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       1.19
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        3.1  TC(MIN.) =     10.80
 EFFECTIVE AREA(ACRES) =      3.10  AREA-AVERAGED Fm(INCH/HR)=  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)   =       1.19
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "A", 5-YEAR STORM EXPECTED VALUE     *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XA-5YR.DAT
  TIME/DATE OF STUDY: 18:02 01/03/2013
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
   1)    5.00;  2.180
   2)   10.00;  1.510
   3)   15.00;  1.200
   4)   20.00;  1.020
   5)   25.00;  0.900
   6)   30.00;  0.830
   7)   40.00;  0.690
   8)   50.00;  0.610
   9)   60.00;  0.550
  10)   90.00;  0.440
  11)  120.00;  0.370
  12)  180.00;  0.310
  13)  360.00;  0.210
  14) 1200.00;  0.090
  *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   45.0     40.0    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

************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1132.30  DOWNSTREAM(FEET) =   1088.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.148
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.501
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        2.00      0.50      1.000     0   10.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       1.80
  TOTAL AREA(ACRES) =       2.00   PEAK FLOW RATE(CFS) =       1.80

************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1088.30  DOWNSTREAM(FEET) =   1077.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0286
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.80
  FLOW VELOCITY(FEET/SEC) =   2.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.27   Tc(MIN.) =   12.42
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     688.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   12.42
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.360
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        4.60      0.50      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.60      SUBAREA RUNOFF(CFS) =     3.56
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =       5.11

************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1077.20  DOWNSTREAM(FEET) =  1073.00
 FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.19
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      5.11
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.62
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.62
 RAINFALL INTENSITY(INCH/HR) =   1.35
 AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.60
 TOTAL STREAM AREA(ACRES) =       6.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.11

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN.) =   14.35   RAINFALL INTENSITY(INCH/HR) =  1.24
 EFFECTIVE AREA(ACRES) =    66.86
 TOTAL AREA(ACRES) =   151.43        PEAK FLOW RATE(CFS) =    207.37
 AREA-AVERAGED Fm(INCH/HR) =   0.25  AREA-AVERAGED Fp(INCH/HR) =   0.50
 AREA-AVERAGED Ap =  0.50
 NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
       CONFLUENCE ANALYSES.

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   14.35
 RAINFALL INTENSITY(INCH/HR) =   1.24
 AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.50
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =      66.86
 TOTAL STREAM AREA(ACRES) =     151.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     207.37

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)            (ACRES)    NODE
     1        5.11   12.62     1.347   0.50( 0.50) 1.00       6.6     300.00
     2      207.37   14.35     1.240   0.50( 0.25) 0.50      66.9     303.00

 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      207.24   12.62     1.347   0.50( 0.28) 0.55      65.4     300.00
     2      211.83   14.35     1.240   0.50( 0.27) 0.54      73.5     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     211.83    Tc(MIN.) =    14.35
 EFFECTIVE AREA(ACRES) =      73.46   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =      158.0
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1073.00  DOWNSTREAM(FEET) =  1056.00
 FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.27
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     211.83
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   14.48
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =    1031.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.48
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.232
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.30      0.50      0.100     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     0.32
 EFFECTIVE AREA(ACRES) =     73.76   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =      158.3      PEAK FLOW RATE(CFS) =     211.83
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1056.00  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  39.02
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     211.83
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   14.50
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    307.00 =    1071.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   14.50
  RAINFALL INTENSITY(INCH/HR) =   1.23
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.50
  AREA-AVERAGED Ap =  0.54
  EFFECTIVE STREAM AREA(ACRES) =      73.76
  TOTAL STREAM AREA(ACRES) =     158.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     211.83

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1103.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.756
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.677
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.80      0.50      1.000     0    8.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1103.00  DOWNSTREAM(FEET) =   1067.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   644.00   CHANNEL SLOPE =  0.0548
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.466
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        3.40      0.50      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.51
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   1.95
  Tc(MIN.) =   10.70
  SUBAREA AREA(ACRES) =     3.40     SUBAREA RUNOFF(CFS) =    2.96
  EFFECTIVE AREA(ACRES) =     4.20    AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      4.2      PEAK FLOW RATE(CFS) =      3.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   6.57
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =     944.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1067.70  DOWNSTREAM(FEET) =   1052.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0177
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.292
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        4.70      0.50      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.26
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   2.81
  Tc(MIN.) =   13.52
  SUBAREA AREA(ACRES) =     4.70     SUBAREA RUNOFF(CFS) =    3.35
  EFFECTIVE AREA(ACRES) =     8.90    AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      8.9      PEAK FLOW RATE(CFS) =      6.34

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   5.59
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    311.00 =    1831.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.52
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.292
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.70      0.50      1.000     -
  USER-DEFINED                -       11.50      0.50      1.000     -
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.20      SUBAREA RUNOFF(CFS) =    8.69
  EFFECTIVE AREA(ACRES) =     21.10   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       21.1       PEAK FLOW RATE(CFS) =      15.04

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1051.10  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.07
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.04
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   13.81
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   13.81
  RAINFALL INTENSITY(INCH/HR) =   1.27
  AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      21.10
  TOTAL STREAM AREA(ACRES) =      21.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      15.04

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      207.24   12.77    1.338  0.50( 0.27) 0.55      65.7     300.00
      1      211.83   14.50    1.231  0.50( 0.27) 0.54      73.8     303.00
      2       15.04   13.81    1.274  0.50( 0.50) 1.00      21.1     308.00

  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      222.28   12.77    1.338  0.50( 0.33) 0.65      85.2     300.00
      2      225.03   13.81    1.274  0.50( 0.33) 0.65      91.6     308.00
      3      226.03   14.50    1.231  0.50( 0.32) 0.64      94.9     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     226.03    Tc(MIN.) =    14.50
  EFFECTIVE AREA(ACRES) =      94.86   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.64
  TOTAL AREA(ACRES) =      179.4
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1050.00  DOWNSTREAM(FEET) =  1025.50
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.95
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     226.03
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   14.74
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.74
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.216
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.80      0.50      0.100     -
  USER-DEFINED                -        2.40      0.50      0.600     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     3.20      SUBAREA RUNOFF(CFS) =     2.82
  EFFECTIVE AREA(ACRES) =     98.06   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.64
  TOTAL AREA(ACRES) =      182.6       PEAK FLOW RATE(CFS) =     226.03
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   14.74
  RAINFALL INTENSITY(INCH/HR) =   1.22
  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.50
  AREA-AVERAGED Ap =  0.64
  EFFECTIVE STREAM AREA(ACRES) =      98.06
  TOTAL STREAM AREA(ACRES) =     182.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     226.03

****************************************************************************
  FLOW PROCESS FROM NODE    333.10 TO NODE    333.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1144.00  DOWNSTREAM(FEET) =   1094.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.892
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.524
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.00      0.50      1.000     0    9.89
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.92
 TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      0.92

****************************************************************************
 FLOW PROCESS FROM NODE    333.11 TO NODE    333.20 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1094.00  DOWNSTREAM(FEET) =   1075.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   275.00   CHANNEL SLOPE =  0.0684
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.92
 FLOW VELOCITY(FEET/SEC) =   3.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =   11.06
 LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.20 =     575.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.20 TO NODE    333.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.06
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.444
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        5.50      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.50   SUBAREA RUNOFF(CFS) =     4.67
 EFFECTIVE AREA(ACRES) =      6.50   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       6.5     PEAK FLOW RATE(CFS) =       5.52

****************************************************************************
 FLOW PROCESS FROM NODE    333.20 TO NODE    333.30 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1075.20  DOWNSTREAM(FEET) =   1032.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   135.00   CHANNEL SLOPE =  0.3200
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       5.52
 FLOW VELOCITY(FEET/SEC.) =  18.62   FLOW DEPTH(FEET) =   0.54
 TRAVEL TIME(MIN.) =   0.12   Tc(MIN.) =   11.18
 LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.30 =     710.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.30 TO NODE    333.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1032.00  DOWNSTREAM ELEVATION(FEET) = 1027.00
 STREET LENGTH(FEET) =   123.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.16
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.36
   HALFSTREET FLOOD WIDTH(FEET) =   11.21
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.68
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.70
 STREET FLOW TRAVEL TIME(MIN.) =   0.44   Tc(MIN.) =   11.62
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.410
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.60      0.50      0.100     -
 USER-DEFINED               -        0.60      0.50      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA AREA(ACRES) =     1.20   SUBAREA RUNOFF(CFS) =     1.27
 EFFECTIVE AREA(ACRES) =      7.70   AREA-AVERAGED Fm(INCH/HR) =  0.46
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.92
 TOTAL AREA(ACRES) =       7.7     PEAK FLOW RATE(CFS) =       6.59

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  11.52
 FLOW VELOCITY(FEET/SEC.) =  4.77   DEPTH*VELOCITY(FT*FT/SEC.) =   1.76
 LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.00 =     833.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   11.62
 RAINFALL INTENSITY(INCH/HR) =   1.41
 AREA-AVERAGED Fm(INCH/HR) =  0.46
 AREA-AVERAGED Fp(INCH/HR) =  0.50
 AREA-AVERAGED Ap =  0.92
```

EXISTING CONDITION, DRAINAGE AREA "A"
5-YEAR STORM, EXPECTED VALUE

```
 EFFECTIVE STREAM AREA(ACRES) =       7.70
 TOTAL STREAM AREA(ACRES) =       7.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.59

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      222.28   13.01    1.323  0.50( 0.32) 0.65      88.4     300.00
     1      225.03   14.04    1.259  0.50( 0.32) 0.64      94.8     308.00
     1      226.03   14.74    1.216  0.50( 0.32) 0.64      98.1     303.00
     2        6.59   11.62    1.410  0.50( 0.46) 0.92       7.7     333.10

 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      222.22   11.62    1.410  0.50( 0.33) 0.67      86.7     333.10
     2      228.27   13.01    1.323  0.50( 0.33) 0.67      96.1     300.00
     3      230.57   14.04    1.259  0.50( 0.33) 0.66     102.5     308.00
     4      231.28   14.74    1.216  0.50( 0.33) 0.66     105.8     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     231.28    Tc(MIN.) =    14.74
 EFFECTIVE AREA(ACRES) =     105.76   AREA-AVERAGED Fm(INCH/HR) =  0.33
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =      190.3
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1025.50  DOWNSTREAM(FEET) =  1024.00
 FLOW LENGTH(FEET) =   109.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.18
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     231.28
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   14.85
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   14.85
 RAINFALL INTENSITY(INCH/HR) =   1.21
 AREA-AVERAGED Fm(INCH/HR) =  0.33
 AREA-AVERAGED Fp(INCH/HR) =  0.50
 AREA-AVERAGED Ap =  0.66
 EFFECTIVE STREAM AREA(ACRES) =     105.76
 TOTAL STREAM AREA(ACRES) =     190.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     231.28

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    335.11 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   243.00
 ELEVATION DATA: UPSTREAM(FEET) =   1077.80  DOWNSTREAM(FEET) =   1075.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.680
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.955
 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                 -        0.20      0.50      0.100     0    6.68
 PUBLIC PARK                -        0.20      0.50      0.850     0   10.61
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA RUNOFF(CFS) =      0.62
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.62

****************************************************************************
 FLOW PROCESS FROM NODE    335.11 TO NODE    335.10 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1075.00  DOWNSTREAM ELEVATION(FEET) = 1070.00
 STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.45
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    5.98
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.83
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
 STREET FLOW TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =    7.95
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.785
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.20      0.50      0.100     -
 USER-DEFINED               -        1.10      0.50      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.735
 SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    1.66
 EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.34
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.67
```

EXISTING CONDITION, DRAINAGE AREA "A"
5-YEAR STORM, EXPECTED VALUE

```
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       2.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.77
  FLOW VELOCITY(FEET/SEC.) =  3.02   DEPTH*VELOCITY(FT*FT/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.10 =     458.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.10 TO NODE    335.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1070.00  DOWNSTREAM ELEVATION(FEET) = 1048.00
  STREET LENGTH(FEET) =   588.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.37
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    8.55
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.98
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.25
  STREET FLOW TRAVEL TIME(MIN.) =   2.46   Tc(MIN.) =   10.41
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.484
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.60      0.50      0.100     -
  USER-DEFINED                -        1.60      0.50      0.850     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
  SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    2.30
  EFFECTIVE AREA(ACRES) =      3.90    AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =       4.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =   9.41
  FLOW VELOCITY(FEET/SEC.) =  4.12   DEPTH*VELOCITY(FT*FT/SEC.) =   1.36
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.20 =    1046.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.20 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1048.00  DOWNSTREAM(FEET) =  1024.00
  FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.52
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        4.06
  PIPE TRAVEL TIME(MIN.) =   0.86    Tc(MIN.) =   11.27
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    336.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.27
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.431
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.30      0.50      0.100     -
  USER-DEFINED                -        0.10      0.50      0.850     -
  USER-DEFINED                -        1.50      0.50      0.100     -
  USER-DEFINED                -        1.50      0.50      0.850     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.453
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    3.69
  EFFECTIVE AREA(ACRES) =      7.30   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =        7.3        PEAK FLOW RATE(CFS) =       7.55

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   11.27
  RAINFALL INTENSITY(INCH/HR) =   1.43
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.50
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =       7.30
  TOTAL STREAM AREA(ACRES) =       7.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.55

  ** CONFLUENCE DATA **
   STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)            (ACRES)    NODE
      1      222.22   11.73     1.403  0.50( 0.33) 0.67      86.7      333.10
      1      228.27   13.12     1.316  0.50( 0.33) 0.67      96.1      300.00
      1      230.57   14.16     1.252  0.50( 0.33) 0.66     102.5      308.00
      1      231.28   14.85     1.209  0.50( 0.33) 0.66     105.8      303.00
      2        7.55   11.27     1.431  0.50( 0.28) 0.56       7.3      335.00

  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      226.75   11.27    1.431  0.50( 0.33) 0.66      90.6     335.00
     2      229.58   11.73    1.403  0.50( 0.33) 0.66      94.0     333.10
     3      235.07   13.12    1.316  0.50( 0.33) 0.66     103.4     300.00
     4      236.95   14.16    1.252  0.50( 0.33) 0.66     109.8     308.00
     5      237.38   14.85    1.209  0.50( 0.33) 0.65     113.1     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     237.38    Tc(MIN.) =    14.85
  EFFECTIVE AREA(ACRES) =     113.06   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =      197.6
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1024.00  DOWNSTREAM(FEET) =   895.30
  FLOW LENGTH(FEET) =   549.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  46.61
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     237.38
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   15.05
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   15.05
  RAINFALL INTENSITY(INCH/HR) =   1.20
  AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.50
  AREA-AVERAGED Ap =  0.65
  EFFECTIVE STREAM AREA(ACRES) =     113.06
  TOTAL STREAM AREA(ACRES) =     197.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     237.38

****************************************************************************
  FLOW PROCESS FROM NODE    373.00 TO NODE    373.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =   1018.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.657
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.407
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.20      0.50     1.000     0   11.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.98
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      0.98

****************************************************************************
  FLOW PROCESS FROM NODE    373.10 TO NODE    374.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1018.00  DOWNSTREAM(FEET) =    895.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.3098
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.377
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        1.80      0.50     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.50
  AVERAGE FLOW DEPTH(FEET) =   0.35   TRAVEL TIME(MIN.) =   0.49
  Tc(MIN.) =   12.15
  SUBAREA AREA(ACRES) =     1.80     SUBAREA RUNOFF(CFS) =    1.42
  EFFECTIVE AREA(ACRES) =     3.00    AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      3.0       PEAK FLOW RATE(CFS) =      2.37

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =  14.83
  LONGEST FLOWPATH FROM NODE    373.00 TO NODE    374.00 =     696.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.15
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.377
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        7.30      0.50     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     7.30     SUBAREA RUNOFF(CFS) =    5.76
  EFFECTIVE AREA(ACRES) =    10.30   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      10.3      PEAK FLOW RATE(CFS) =      8.13

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =    12.15
 RAINFALL INTENSITY(INCH/HR) =    1.38
 AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      10.30
 TOTAL STREAM AREA(ACRES) =      10.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.13

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1      226.75   11.47    1.419  0.50( 0.33) 0.66       90.6      335.00
     1      229.58   11.93    1.390  0.50( 0.33) 0.66       94.0      333.10
     1      235.07   13.32    1.304  0.50( 0.33) 0.66      103.4      300.00
     1      236.95   14.35    1.240  0.50( 0.33) 0.66      109.8      308.00
     1      237.38   15.05    1.198  0.50( 0.33) 0.65      113.1      303.00
     2        8.13   12.15    1.377  0.50( 0.50) 1.00       10.3      373.00

 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      234.79   11.47    1.419  0.50( 0.35) 0.69      100.3      335.00
     2      237.69   11.93    1.390  0.50( 0.35) 0.69      104.1      333.10
     3      238.57   12.15    1.377  0.50( 0.35) 0.69      105.8      373.00
     4      242.52   13.32    1.304  0.50( 0.35) 0.69      113.7      300.00
     5      243.81   14.35    1.240  0.50( 0.34) 0.69      120.1      308.00
     6      243.85   15.05    1.198  0.50( 0.34) 0.68      123.4      303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     243.85    Tc(MIN.) =    15.05
 EFFECTIVE AREA(ACRES) =     123.36   AREA-AVERAGED Fm(INCH/HR) =  0.34
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.68
 TOTAL AREA(ACRES) =      207.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    377.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   895.30  DOWNSTREAM(FEET) =   890.00
 FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.43
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     243.85
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   15.17
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   15.17
 RAINFALL INTENSITY(INCH/HR) =   1.19
 AREA-AVERAGED Fm(INCH/HR) =  0.34
 AREA-AVERAGED Fp(INCH/HR) =  0.50
 AREA-AVERAGED Ap =  0.68
 EFFECTIVE STREAM AREA(ACRES) =    123.36
 TOTAL STREAM AREA(ACRES) =    207.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    243.85

****************************************************************************
 FLOW PROCESS FROM NODE    375.00 TO NODE    376.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1140.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.544
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.705
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.30      0.50      1.000     0    8.54
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.41
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      1.41

****************************************************************************
 FLOW PROCESS FROM NODE    376.00 TO NODE    377.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1036.00  DOWNSTREAM(FEET) =    882.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.2034
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      1.41
 FLOW VELOCITY(FEET/SEC) =   5.07 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.49   Tc(MIN.) =   11.03
 LONGEST FLOWPATH FROM NODE    375.00 TO NODE    377.00 =    1057.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.03
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.446
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        4.70      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
```

EXISTING CONDITION, DRAINAGE AREA "A"
5-YEAR STORM, EXPECTED VALUE

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  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =     4.00
  EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.0       PEAK FLOW RATE(CFS) =       5.11

****************************************************************************
  FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   11.03
  RAINFALL INTENSITY(INCH/HR) =   1.45
  AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.00
  TOTAL STREAM AREA(ACRES) =       6.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.11

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      234.79   11.60    1.411  0.50( 0.35) 0.69     100.3     335.00
      1      237.69   12.06    1.382  0.50( 0.35) 0.69     104.1     333.10
      1      238.57   12.28    1.369  0.50( 0.35) 0.69     105.8     373.00
      1      242.52   13.45    1.296  0.50( 0.35) 0.69     113.7     300.00
      1      243.81   14.48    1.232  0.50( 0.34) 0.69     120.1     308.00
      1      243.85   15.17    1.194  0.50( 0.34) 0.68     123.4     303.00
      2        5.11   11.03    1.446  0.50( 0.50) 1.00       6.0     375.00

  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      235.82   11.03    1.446  0.50( 0.36) 0.71     101.4     375.00
      2      239.71   11.60    1.411  0.50( 0.36) 0.71     106.3     335.00
      3      242.45   12.06    1.382  0.50( 0.36) 0.71     110.1     333.10
      4      243.26   12.28    1.369  0.50( 0.36) 0.71     111.8     373.00
      5      246.82   13.45    1.296  0.50( 0.35) 0.71     119.7     300.00
      6      247.76   14.48    1.232  0.50( 0.35) 0.70     126.1     308.00
      7      247.60   15.17    1.194  0.50( 0.35) 0.70     129.4     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     247.76    Tc(MIN.) =    14.48
  EFFECTIVE AREA(ACRES) =     126.14   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.70
  TOTAL AREA(ACRES) =      213.9
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    381.00 TO NODE    382.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    992.00  DOWNSTREAM(FEET) =    914.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.637
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.20      0.50      1.000     0    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.10      0.50      1.000     0    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.33
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      1.33

****************************************************************************
  FLOW PROCESS FROM NODE    383.10 TO NODE    383.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1022.00  DOWNSTREAM(FEET) =   1008.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.730
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.680
  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                 -        0.50      0.50      0.850     0    8.73
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.56
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      0.56

****************************************************************************
  FLOW PROCESS FROM NODE    383.20 TO NODE    383.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1008.00  DOWNSTREAM(FEET) =    988.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   347.00   CHANNEL SLOPE =  0.0576
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.588
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.00      0.50      0.850     -
  USER-DEFINED                -        2.40      0.50      0.850     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.39
```

```
 AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   0.69
 Tc(MIN.) =    9.42
 SUBAREA AREA(ACRES) =      4.40       SUBAREA RUNOFF(CFS) =    4.60
 EFFECTIVE AREA(ACRES) =      4.90     AREA-AVERAGED Fm(INCH/HR) =   0.43
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   0.85
 TOTAL AREA(ACRES) =        4.9         PEAK FLOW RATE(CFS) =       5.13

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.73   FLOW VELOCITY(FEET/SEC.) =   9.63
 LONGEST FLOWPATH FROM NODE    383.10 TO NODE    383.00 =     647.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    384.10 TO NODE    384.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.468
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.60      0.50      1.000     0   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =       0.52
 TOTAL AREA(ACRES) =       0.60   PEAK FLOW RATE(CFS) =       0.52

****************************************************************************
 FLOW PROCESS FROM NODE    385.10 TO NODE    385.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1105.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.896
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.658
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.00      0.50      1.000     0    8.90
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =       1.04
 TOTAL AREA(ACRES) =       1.00   PEAK FLOW RATE(CFS) =       1.04

****************************************************************************
 FLOW PROCESS FROM NODE    385.20 TO NODE    385.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    980.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   390.00   CHANNEL SLOPE =  0.3205
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.04
 FLOW VELOCITY(FEET/SEC) =   3.21 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =   10.92
 LONGEST FLOWPATH FROM NODE    385.10 TO NODE    385.00 =     690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    385.00 TO NODE    385.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.92
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.453
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.30      0.50      1.000     -
 USER-DEFINED                -        2.30      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     2.23
 EFFECTIVE AREA(ACRES) =      3.60    AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       3.09
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        3.6  TC(MIN.) =     10.92
 EFFECTIVE AREA(ACRES) =      3.60  AREA-AVERAGED Fm(INCH/HR)=  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       3.09
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "B", 5-YEAR STORM EXPECTED VALUE     *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XB-5YR.DAT
  TIME/DATE OF STUDY: 19:07 01/03/2013
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
   1)    5.00;  2.180
   2)   10.00;  1.510
   3)   15.00;  1.200
   4)   20.00;  1.020
   5)   25.00;  0.900
   6)   30.00;  0.830
   7)   40.00;  0.690
   8)   50.00;  0.610
   9)   60.00;  0.550
  10)   90.00;  0.440
  11)  120.00;  0.370
  12)  180.00;  0.310
  13)  360.00;  0.210
  14) 1200.00;  0.090
  *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

************************************************************************
  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) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1207.00  DOWNSTREAM(FEET) =   1142.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.386
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.592
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.80      0.50      1.000     0    9.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.79
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      0.79

************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1142.00  DOWNSTREAM(FEET) =   1136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE =  0.0189
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.79
  FLOW VELOCITY(FEET/SEC) =   2.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.57   Tc(MIN.) =   11.96
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     618.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   11.96
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.389
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.80      0.50      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.80     SUBAREA RUNOFF(CFS) =     2.24
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.6       PEAK FLOW RATE(CFS) =       2.88

************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  52
------------------------------------------------------------------------
```

EXISTING CONDITION, DRAINAGE AREA "B"
5-YEAR STORM, EXPECTED VALUE

```
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1136.00  DOWNSTREAM(FEET) =   1124.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0320
CHANNEL FLOW THRU SUBAREA(CFS) =       2.88
FLOW VELOCITY(FEET/SEC) =   3.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.88   Tc(MIN.) =   13.84
LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     993.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   13.84
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.272
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        1.50      0.50      1.000     -
USER-DEFINED                -        3.50      0.50      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     5.00      SUBAREA RUNOFF(CFS) =     3.47
EFFECTIVE AREA(ACRES) =      8.60   AREA-AVERAGED Fm(INCH/HR) =  0.50
AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       8.6       PEAK FLOW RATE(CFS) =       5.97

****************************************************************************
FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1124.00  DOWNSTREAM(FEET) =   1120.60
CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0148
CHANNEL FLOW THRU SUBAREA(CFS) =       5.97
FLOW VELOCITY(FEET/SEC) =   2.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.43   Tc(MIN.) =   15.27
LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1223.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   15.27
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.190
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        4.50      0.50      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     4.50      SUBAREA RUNOFF(CFS) =     2.79
EFFECTIVE AREA(ACRES) =     13.10   AREA-AVERAGED Fm(INCH/HR) =  0.50
AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =       8.14

****************************************************************************
FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1120.60  DOWNSTREAM(FEET) =  1052.00
FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  16.20
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =        8.14
PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =   15.83
LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1773.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1052.00  DOWNSTREAM(FEET) =   1009.20
CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0718
CHANNEL FLOW THRU SUBAREA(CFS) =       8.14
FLOW VELOCITY(FEET/SEC) =   6.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.56   Tc(MIN.) =   17.40
LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    2369.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   17.40
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.114
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        0.10      0.50      1.000     -
USER-DEFINED                -        5.40      0.50      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =     3.04
EFFECTIVE AREA(ACRES) =     18.60   AREA-AVERAGED Fm(INCH/HR) =  0.50
AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       18.6       PEAK FLOW RATE(CFS) =      10.27

****************************************************************************
FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   17.40
RAINFALL INTENSITY(INCH/HR) =   1.11
AREA-AVERAGED Fm(INCH/HR) =  0.50
AREA-AVERAGED Fp(INCH/HR) =  0.50
AREA-AVERAGED Ap =  1.00
```

EXISTING CONDITION, DRAINAGE AREA "B"
5-YEAR STORM, EXPECTED VALUE

```
 EFFECTIVE STREAM AREA(ACRES) =      18.60
 TOTAL STREAM AREA(ACRES) =      18.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.27

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1242.00  DOWNSTREAM(FEET) =   1216.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.292
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.430
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.70      0.50      1.000     0   11.29
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.59
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      0.59

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1216.20  DOWNSTREAM(FEET) =   1188.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   460.00   CHANNEL SLOPE =  0.0613
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      0.59
 FLOW VELOCITY(FEET/SEC) =   3.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.06   Tc(MIN.) =   13.36
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.36
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.302
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        1.60      0.50      1.000     -
 USER-DEFINED                -        0.80      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.40      SUBAREA RUNOFF(CFS) =     1.73
 EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      3.1       PEAK FLOW RATE(CFS) =      2.24

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1188.00  DOWNSTREAM(FEET) =   1107.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.1419
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      2.24
 FLOW VELOCITY(FEET/SEC) =   5.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =   15.05
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1325.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.05
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.198
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        4.80      0.50      1.000     -
 USER-DEFINED                -        2.20      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.00      SUBAREA RUNOFF(CFS) =     4.40
 EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      10.1       PEAK FLOW RATE(CFS) =      6.35

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1107.80  DOWNSTREAM(FEET) =   1082.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE =  0.0956
 CHANNEL FLOW THRU SUBAREA(CFS) =      6.35
 FLOW VELOCITY(FEET/SEC) =   6.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.65   Tc(MIN.) =   15.70
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.70
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.175
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        5.70      0.50      1.000     -
 USER-DEFINED                -        0.60      0.50      1.000     -
 USER-DEFINED                -        0.30      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
 SUBAREA AREA(ACRES) =     6.60      SUBAREA RUNOFF(CFS) =     4.01
 EFFECTIVE AREA(ACRES) =     16.70   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       16.7       PEAK FLOW RATE(CFS) =      10.14

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1082.00  DOWNSTREAM(FEET) =  1062.00
 FLOW LENGTH(FEET) =   324.00   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.) =  13.31
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.14
 PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   16.10
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   870.00   CHANNEL SLOPE =  0.0607
 CHANNEL FLOW THRU SUBAREA(CFS) =      10.14
 FLOW VELOCITY(FEET/SEC) =   6.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.35   Tc(MIN.) =   18.45
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.45
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.076
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -       10.30      0.50      1.000     -
 USER-DEFINED               -        2.10      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.40      SUBAREA RUNOFF(CFS) =     6.42
 EFFECTIVE AREA(ACRES) =     29.10   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       29.1       PEAK FLOW RATE(CFS) =      15.07

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   18.45
 RAINFALL INTENSITY(INCH/HR) =   1.08
 AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      29.10
 TOTAL STREAM AREA(ACRES) =      29.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      15.07

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       10.27   17.40    1.114  0.50( 0.50) 1.00      18.6       1.00
     2       15.07   18.45    1.076  0.50( 0.50) 1.00      29.1       8.00

 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       25.34   17.40    1.114  0.50( 0.50) 1.00      46.0       1.00
     2       24.71   18.45    1.076  0.50( 0.50) 1.00      47.7       8.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      25.34    Tc(MIN.) =    17.40
 EFFECTIVE AREA(ACRES) =      46.04   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      47.7
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1012.00  DOWNSTREAM(FEET) =    954.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.3222
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      25.34
 FLOW VELOCITY(FEET/SEC.) =  20.21   FLOW DEPTH(FEET) =   0.24
 TRAVEL TIME(MIN.) =   0.15   Tc(MIN.) =   17.55
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     14.00 =    2969.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     82.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    954.00  DOWNSTREAM(FEET) =    917.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0663
 CHANNEL FLOW THRU SUBAREA(CFS) =      25.34
 FLOW VELOCITY(FEET/SEC) =   8.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.13   Tc(MIN.) =   18.68
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     82.00 =    3527.00 FEET.
```

EXISTING CONDITION, DRAINAGE AREA "B"
5-YEAR STORM, EXPECTED VALUE

```
**************************************************************************
 FLOW PROCESS FROM NODE     82.00 TO NODE     82.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   18.68
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.068
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.10      0.50      1.000     -
 USER-DEFINED                -       29.30      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   29.40      SUBAREA RUNOFF(CFS) =   15.02
 EFFECTIVE AREA(ACRES) =     75.44   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       77.1       PEAK FLOW RATE(CFS) =      38.53
==========================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       77.1  TC(MIN.) =     18.68
 EFFECTIVE AREA(ACRES) =     75.44  AREA-AVERAGED Fm(INCH/HR)=  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      38.53

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1       38.53   18.68    1.068  0.50( 0.50) 1.00       75.4        1.00
     2       36.73   19.74    1.029  0.50( 0.50) 1.00       77.1        8.00
==========================================================================
==========================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "C", 5-YEAR STORM EXPECTED VALUE     *
* PORTOLLA TRACTS 15353 & 17300                                          *
* W.O. #3751-1                                                           *
 **************************************************************************

  FILE NAME: XC-5YR.DAT
  TIME/DATE OF STUDY: 13:57 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
   1)    5.00;  2.180
   2)   10.00;  1.510
   3)   15.00;  1.200
   4)   20.00;  1.020
   5)   25.00;  0.900
   6)   30.00;  0.830
   7)   40.00;  0.690
   8)   50.00;  0.610
   9)   60.00;  0.550
  10)   90.00;  0.440
  11)  120.00;  0.370
  12)  180.00;  0.310
  13)  360.00;  0.210
  14) 1200.00;  0.090
  *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

**************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1128.00  DOWNSTREAM(FEET) =   1050.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.637
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.40      0.50      1.000     0    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.20      0.50      1.000     0    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.61
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      0.61

**************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   295.00   CHANNEL SLOPE =  0.1695
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.61
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.04   Tc(MIN.) =   10.09
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    115.00 =     595.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   10.09
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.505
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        1.40      0.50      1.000     -
  USER-DEFINED                -        1.60      0.50      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     3.00     SUBAREA RUNOFF(CFS) =     2.71
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.6       PEAK FLOW RATE(CFS) =       3.25
```

EXISTING CONDITION, DRAINAGE AREA "C"
5-YEAR STORM, EXPECTED VALUE

```
****************************************************************************
  FLOW PROCESS FROM NODE     115.00 TO NODE     116.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    870.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1055.00   CHANNEL SLOPE =  0.1232
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.25
  FLOW VELOCITY(FEET/SEC) =   6.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.91   Tc(MIN.) =   12.99
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    116.00 =    1650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     116.00 TO NODE     116.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.99
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.324
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.40      0.50      1.000     -
  USER-DEFINED                -       13.20      0.50      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.60      SUBAREA RUNOFF(CFS) =   10.09
  EFFECTIVE AREA(ACRES) =     17.20   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       17.2       PEAK FLOW RATE(CFS) =      12.76
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       17.2  TC(MIN.) =     12.99
  EFFECTIVE AREA(ACRES) =     17.20  AREA-AVERAGED Fm(INCH/HR)=  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      12.76
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "C"
5-YEAR STORM, EXPECTED VALUE

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "D", 5-YEAR STORM EXPECTED VALUE     *
* PORTOLLA TRACTS 15353 & 17300                                          *
* W.O. #3751-1                                                           *
 **************************************************************************

  FILE NAME: XD-5YR.DAT
  TIME/DATE OF STUDY: 18:37 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
   1)    5.00;  2.180
   2)   10.00;  1.510
   3)   15.00;  1.200
   4)   20.00;  1.020
   5)   25.00;  0.900
   6)   30.00;  0.830
   7)   40.00;  0.690
   8)   50.00;  0.610
   9)   60.00;  0.550
  10)   90.00;  0.440
  11)  120.00;  0.370
  12)  180.00;  0.310
  13)  360.00;  0.210
  14) 1200.00;  0.090
  *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

**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  300.00
  ELEVATION DATA: UPSTREAM(FEET) =  1130.00  DOWNSTREAM(FEET) =  1030.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.611
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.696
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.90      0.50      1.000     0    8.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.97
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      0.97

**************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1030.00  DOWNSTREAM(FEET) =   990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  247.00   CHANNEL SLOPE =  0.1619
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.97
  FLOW VELOCITY(FEET/SEC) =  4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  0.87   Tc(MIN.) =    9.48
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     547.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    9.48
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.580
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.30      0.50      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    2.23
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.2       PEAK FLOW RATE(CFS) =       3.11

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.10 IS CODE =  52
```

EXISTING CONDITION, DRAINAGE AREA "D"
5-YEAR STORM, EXPECTED VALUE

```
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
 ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    950.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.1250
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.11
 FLOW VELOCITY(FEET/SEC) =   5.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.89   Tc(MIN.) =   10.37
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.10 =     867.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    202.10 TO NODE    202.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.37
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.487
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        2.20      0.50      1.000     -
 USER-DEFINED                -        0.40      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     2.31
 EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       5.8       PEAK FLOW RATE(CFS) =       5.15

****************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1057.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.171
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.621
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.70      0.50      1.000     0    9.17
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.71
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      0.71

****************************************************************************
 FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1057.00  DOWNSTREAM(FEET) =   1026.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE =  0.2441
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.71
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.45   Tc(MIN.) =    9.62
 LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.10 =     427.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    204.10 TO NODE    204.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.62
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.561
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.40      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     0.38
 EFFECTIVE AREA(ACRES) =      1.10   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       1.1       PEAK FLOW RATE(CFS) =       1.05

****************************************************************************
 FLOW PROCESS FROM NODE    204.10 TO NODE    204.20 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1026.00  DOWNSTREAM(FEET) =    950.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   389.00   CHANNEL SLOPE =  0.1954
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.05
 FLOW VELOCITY(FEET/SEC) =   4.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.35   Tc(MIN.) =   10.97
 LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.20 =     816.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    204.20 TO NODE    204.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.97
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.450
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        1.40      0.50      1.000     -
 USER-DEFINED                -        0.60      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.00      SUBAREA RUNOFF(CFS) =     1.71
 EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       3.1       PEAK FLOW RATE(CFS) =       2.65

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

EXISTING CONDITION, DRAINAGE AREA "D"
5-YEAR STORM, EXPECTED VALUE

```
 FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1118.00  DOWNSTREAM(FEET) =   1062.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.554
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.80      0.50     1.000     0    9.67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.76
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      0.76

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    206.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1027.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.3182
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.76
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.39   Tc(MIN.) =   10.06
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    206.10 =     410.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    206.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.06
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.506
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.50      0.50     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50   SUBAREA RUNOFF(CFS) =     0.45
 EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      1.3    PEAK FLOW RATE(CFS) =      1.18

****************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    207.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1027.00  DOWNSTREAM(FEET) =    930.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   423.00   CHANNEL SLOPE =  0.2293
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.18
 FLOW VELOCITY(FEET/SEC) =   4.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.44   Tc(MIN.) =   11.50
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =     833.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.50
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.417
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        1.30      0.50     1.000     -
 USER-DEFINED                -        0.60      0.50     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.90   SUBAREA RUNOFF(CFS) =     1.57
 EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      3.2    PEAK FLOW RATE(CFS) =      2.64

****************************************************************************
 FLOW PROCESS FROM NODE    200.10 TO NODE    200.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1134.00  DOWNSTREAM(FEET) =   1073.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.506
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.576
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.10      0.50     1.000     0    9.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.07
 TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      1.07

****************************************************************************
 FLOW PROCESS FROM NODE    200.20 TO NODE    200.30 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1073.00  DOWNSTREAM(FEET) =    990.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.1137
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.445
```

EXISTING CONDITION, DRAINAGE AREA "D"
5-YEAR STORM, EXPECTED VALUE

```
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.70      0.50      1.000     -
 USER-DEFINED               -        1.80      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.13
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.90
 AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   1.54
 Tc(MIN.) =   11.05
 SUBAREA AREA(ACRES) =     2.50       SUBAREA RUNOFF(CFS) =    2.13
 EFFECTIVE AREA(ACRES) =      3.60     AREA-AVERAGED Fm(INCH/HR) =   0.50
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        3.6         PEAK FLOW RATE(CFS) =       3.06

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   9.02
 LONGEST FLOWPATH FROM NODE    200.10 TO NODE    200.30 =    1030.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.05
 RAINFALL INTENSITY(INCH/HR) =   1.45
 AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       3.60
 TOTAL STREAM AREA(ACRES) =      3.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.06

****************************************************************************
 FLOW PROCESS FROM NODE    200.31 TO NODE    200.32 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1238.00  DOWNSTREAM(FEET) =   1204.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.468
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               -        0.40      0.50      1.000     0   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.35
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
 FLOW PROCESS FROM NODE    200.32 TO NODE    200.33 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1204.00  DOWNSTREAM(FEET) =   1150.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE =  0.3253
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.35
 FLOW VELOCITY(FEET/SEC) =   3.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =   11.55
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.33 =     466.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.33 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.55
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.414
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.20      0.50      1.000     -
 USER-DEFINED               -        0.30      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    0.41
 EFFECTIVE AREA(ACRES) =      0.90     AREA-AVERAGED Fm(INCH/HR) =   0.50
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       0.74

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.34 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =   1100.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   159.00   CHANNEL SLOPE =  0.3145
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.74
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.56   Tc(MIN.) =   12.11
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.34 =     625.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.34 TO NODE    200.34 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.11
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.379
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.80      0.50      1.000     -
 USER-DEFINED               -        0.90      0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
  SUBAREA AREA(ACRES) =     1.70      SUBAREA RUNOFF(CFS) =     1.34
  EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       2.06

****************************************************************************
  FLOW PROCESS FROM NODE     200.34 TO NODE      82.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =   1085.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0791
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.06
  FLOW VELOCITY(FEET/SEC) =   4.87 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =   12.75
  LONGEST FLOWPATH FROM NODE     200.31 TO NODE      82.10 =      812.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      82.10 TO NODE      82.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.75
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.340
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.00      0.50      1.000     -
  USER-DEFINED                -        0.40      0.50      1.000     -
  USER-DEFINED                -        1.10      0.50      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     3.50      SUBAREA RUNOFF(CFS) =     2.64
  EFFECTIVE AREA(ACRES) =      6.10   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =       4.61

****************************************************************************
  FLOW PROCESS FROM NODE      82.10 TO NODE     200.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1085.20  DOWNSTREAM(FEET) =   990.00
  FLOW LENGTH(FEET) =   392.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.43
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.61
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   13.12
  LONGEST FLOWPATH FROM NODE     200.31 TO NODE     200.30 =    1204.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     200.30 TO NODE     200.30 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.) =   13.12
  RAINFALL INTENSITY(INCH/HR) =   1.32
  AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.10
  TOTAL STREAM AREA(ACRES) =       6.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.61

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
      1        3.06   11.05     1.445  0.50( 0.50) 1.00        3.6      200.10
      2        4.61   13.12     1.316  0.50( 0.50) 1.00        6.1      200.31

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
      1        7.55   11.05     1.445  0.50( 0.50) 1.00        8.7      200.10
      2        7.25   13.12     1.316  0.50( 0.50) 1.00        9.7      200.31

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.55    Tc(MIN.) =    11.05
  EFFECTIVE AREA(ACRES) =       8.73   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.7
  LONGEST FLOWPATH FROM NODE     200.31 TO NODE     200.30 =    1204.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     200.30 TO NODE     200.40 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    970.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1250
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.55
  FLOW VELOCITY(FEET/SEC) =   7.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.36   Tc(MIN.) =   11.41
  LONGEST FLOWPATH FROM NODE     200.31 TO NODE     200.40 =    1364.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     200.40 TO NODE     200.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.41
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.423
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.90      0.50      1.000     -
  USER-DEFINED                -        0.20      0.50      1.000     -
  USER-DEFINED                -        0.50      0.50      1.000     -
```

EXISTING CONDITION, DRAINAGE AREA "D"
5-YEAR STORM, EXPECTED VALUE

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     1.33
  EFFECTIVE AREA(ACRES) =     10.33   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.3       PEAK FLOW RATE(CFS) =       8.58

****************************************************************************
  FLOW PROCESS FROM NODE    200.40 TO NODE    200.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    970.00  DOWNSTREAM(FEET) =    949.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   156.00   CHANNEL SLOPE =  0.1346
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.58
  FLOW VELOCITY(FEET/SEC) =   7.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.34   Tc(MIN.) =   11.75
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.50 =    1520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.50 TO NODE    200.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.75
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.401
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.60      0.50      1.000     -
  USER-DEFINED               -        0.30      0.50      1.000     -
  USER-DEFINED               -        1.20      0.50      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.10      SUBAREA RUNOFF(CFS) =     1.70
  EFFECTIVE AREA(ACRES) =     12.43   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.4       PEAK FLOW RATE(CFS) =      10.09
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       13.4  TC(MIN.) =     11.75
  EFFECTIVE AREA(ACRES) =     12.43  AREA-AVERAGED Fm(INCH/HR)=  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      10.09

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       10.09   11.75    1.401  0.50( 0.50) 1.00       12.4      200.10
      2        9.31   13.84    1.272  0.50( 0.50) 1.00       13.4      200.31
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "D"
5-YEAR STORM, EXPECTED VALUE

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

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 ************************* DESCRIPTION OF STUDY ************************
* EXISTING HYDROLOGY, AREAS "E" & "F", 5-YEAR EXPECTED VALUE             *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 **************************************************************************

  FILE NAME: X-EF-5.DAT
  TIME/DATE OF STUDY: 09:38 01/24/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
    1)    5.00;  2.180
    2)   10.00;  1.510
    3)   15.00;  1.200
    4)   20.00;  1.020
    5)   25.00;  0.900
    6)   30.00;  0.830
    7)   40.00;  0.690
    8)   50.00;  0.610
    9)   60.00;  0.550
   10)   90.00;  0.440
   11)  120.00;  0.370
   12)  180.00;  0.310
   13)  360.00;  0.210
   14) 1200.00;  0.090
  *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   45.0     40.0   0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.10 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1078.00  DOWNSTREAM(FEET) =   1072.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.509
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.978
  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                 -        0.50      0.50      0.850     0   10.34
  COMMERCIAL                  -        0.20      0.50      0.100     0    6.51
  COMMERCIAL                  -        0.20      0.50      0.100     0    6.51
  PUBLIC PARK                 -        0.10      0.50      0.850     0   10.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.550
  SUBAREA RUNOFF(CFS) =      1.53
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      1.53

**************************************************************************
  FLOW PROCESS FROM NODE    400.10 TO NODE    401.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) = 1072.00  DOWNSTREAM ELEVATION(FEET) = 1058.00
  STREET LENGTH(FEET) =   321.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.70
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    7.23
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.09
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.19
  STREET FLOW TRAVEL TIME(MIN.) =   1.31   Tc(MIN.) =    7.82
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.803
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.40      0.50      0.850     -
  USER-DEFINED                -        1.10      0.50      0.850     -
  USER-DEFINED                -        0.30      0.50      0.100     -
```

EXISTING CONDITION, DRAINAGE AREAS "E" & "F"
5-YEAR STORM, EXPECTED VALUE

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
  SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =     2.33
  EFFECTIVE AREA(ACRES) =      2.80    AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        2.8        PEAK FLOW RATE(CFS) =       3.71

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   8.63
  FLOW VELOCITY(FEET/SEC.) =  4.31   DEPTH*VELOCITY(FT*FT/SEC.) =   1.37
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    401.00 =     621.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1058.00  DOWNSTREAM ELEVATION(FEET) =  990.00
  STREET LENGTH(FEET) =   803.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.02
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.12
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.98
  STREET FLOW TRAVEL TIME(MIN.) =   2.19   Tc(MIN.) =   10.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.510
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.60      0.50      0.500     -
  USER-DEFINED                -        0.20      0.50      0.500     -
  USER-DEFINED                -        2.20      0.50      0.850     -
  USER-DEFINED                -        0.60      0.50      0.100     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.647
  SUBAREA AREA(ACRES) =     3.60      SUBAREA RUNOFF(CFS) =     3.84
  EFFECTIVE AREA(ACRES) =      6.40    AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =        6.4        PEAK FLOW RATE(CFS) =       6.81

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =   9.88
  FLOW VELOCITY(FEET/SEC.) =  6.39   DEPTH*VELOCITY(FT*FT/SEC.) =   2.17
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =    1424.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.510
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.30      0.50      0.850     -
  USER-DEFINED                -        0.20      0.50      1.000     -
  USER-DEFINED                -        0.60      0.50      0.850     -
  USER-DEFINED                -        7.10      0.50      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
  SUBAREA AREA(ACRES) =     8.20      SUBAREA RUNOFF(CFS) =     7.51
  EFFECTIVE AREA(ACRES) =     14.60    AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =       14.6        PEAK FLOW RATE(CFS) =      14.32

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    500.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    948.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.815
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.535
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.30      0.50      1.000     0    9.81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.21
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      1.21

****************************************************************************
  FLOW PROCESS FROM NODE    500.10 TO NODE    501.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    948.00  DOWNSTREAM(FEET) =    920.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.1000
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.21
  FLOW VELOCITY(FEET/SEC) =   4.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.95   Tc(MIN.) =   10.76
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    501.00 =     580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.76
```

```
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.463
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        1.10      0.50      1.000     -
USER-DEFINED                -        0.70      0.50      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =     1.56
EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.50
AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       2.69
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =        3.1  TC(MIN.) =     10.76
EFFECTIVE AREA(ACRES) =      3.10  AREA-AVERAGED Fm(INCH/HR)=  0.50
AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)    =       2.69
================================================================================
================================================================================
END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "A", 10-YEAR STORM EXPECTED VALUE    *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 **************************************************************************

  FILE NAME: XA-10YR.DAT
  TIME/DATE OF STUDY: 17:24 01/03/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   45.0     40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE     300.00 TO NODE     301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1132.30  DOWNSTREAM(FEET) =   1088.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.148
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.140
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        2.00      0.30      1.000     0   10.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.31
  TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      3.31

**************************************************************************
  FLOW PROCESS FROM NODE     301.00 TO NODE     302.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1088.30  DOWNSTREAM(FEET) =   1077.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0286
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.31
  FLOW VELOCITY(FEET/SEC) =   3.25 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.99   Tc(MIN.) =   12.14
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     688.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     302.00 TO NODE     302.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   12.14
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.935
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        4.60      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.60     SUBAREA RUNOFF(CFS) =     6.77
  EFFECTIVE AREA(ACRES) =     6.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      6.6      PEAK FLOW RATE(CFS) =      9.71

**************************************************************************
  FLOW PROCESS FROM NODE     302.00 TO NODE     303.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1077.20  DOWNSTREAM(FEET) =  1073.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.90
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.71
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   12.31
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     303.00 TO NODE     303.00 IS CODE =   1
--------------------------------------------------------------------------
```

```
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.31
 RAINFALL INTENSITY(INCH/HR) =   1.92
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.60
 TOTAL STREAM AREA(ACRES) =       6.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.71

**************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   7
--------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN.) =   14.35   RAINFALL INTENSITY(INCH/HR) =  1.76
 EFFECTIVE AREA(ACRES) =    66.86
 TOTAL AREA(ACRES) =   151.43         PEAK FLOW RATE(CFS) =    207.37
 AREA-AVERAGED Fm(INCH/HR) =   0.15  AREA-AVERAGED Fp(INCH/HR) =   0.30
 AREA-AVERAGED Ap =  0.50
 NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
       CONFLUENCE ANALYSES.

**************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   14.35
 RAINFALL INTENSITY(INCH/HR) =   1.76
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =      66.86
 TOTAL STREAM AREA(ACRES) =     151.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     207.37

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        9.71   12.31    1.920  0.30( 0.30) 1.00       6.6     300.00
     2      207.37   14.35    1.761  0.30( 0.15) 0.50      66.9     303.00

 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      205.12   12.31    1.920  0.30( 0.17) 0.55      64.0     300.00
     2      216.13   14.35    1.761  0.30( 0.16) 0.54      73.5     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

 PEAK FLOW RATE(CFS) =     216.13    Tc(MIN.) =    14.35
 EFFECTIVE AREA(ACRES) =      73.46   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =      158.0
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1073.00  DOWNSTREAM(FEET) =  1056.00
 FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  30.18
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     216.13
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   14.48
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =    1031.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   14.48
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.753
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.30     0.30      0.100     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     0.47
 EFFECTIVE AREA(ACRES) =     73.76   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =      158.3       PEAK FLOW RATE(CFS) =     216.13
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

**************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    307.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1056.00  DOWNSTREAM(FEET) =  1050.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  39.13
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     216.13
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   14.49
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    307.00 =    1071.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   14.49
 RAINFALL INTENSITY(INCH/HR) =   1.75
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.54
 EFFECTIVE STREAM AREA(ACRES) =      73.76
 TOTAL STREAM AREA(ACRES) =     158.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     216.13

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1103.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.756
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.325
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.80      0.30     1.000     0    8.76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.46
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.46

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1103.00  DOWNSTREAM(FEET) =   1067.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   644.00   CHANNEL SLOPE =  0.0548
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.123
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        3.40      0.30     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.25
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.98
 AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   1.54
 Tc(MIN.) =   10.30
 SUBAREA AREA(ACRES) =     3.40      SUBAREA RUNOFF(CFS) =    5.58
 EFFECTIVE AREA(ACRES) =     4.20    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      4.2        PEAK FLOW RATE(CFS) =      6.89

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   8.28
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =     944.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1067.70  DOWNSTREAM(FEET) =   1052.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0177
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.898
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        4.70      0.30     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     10.27
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.52
 AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   2.27
 Tc(MIN.) =   12.56
 SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =    6.76
 EFFECTIVE AREA(ACRES) =     8.90    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      8.9        PEAK FLOW RATE(CFS) =     12.80

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.49   FLOW VELOCITY(FEET/SEC.) =   6.97
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    311.00 =    1831.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.56
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.898
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.70      0.30     1.000     -
 USER-DEFINED                -       11.50      0.30     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.20      SUBAREA RUNOFF(CFS) =   17.55
 EFFECTIVE AREA(ACRES) =    21.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      21.1       PEAK FLOW RATE(CFS) =      30.35

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1051.10  DOWNSTREAM(FEET) =  1050.00
 FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
```

EXISTING CONDITION, DRAINAGE AREA "A"
10-YEAR STORM, EXPECTED VALUE

```
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.37
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      30.35
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   12.81
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   12.81
 RAINFALL INTENSITY(INCH/HR) =   1.88
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      21.10
 TOTAL STREAM AREA(ACRES) =      21.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      30.35

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      205.12   12.46    1.907  0.30( 0.16) 0.55      64.3     300.00
     1      216.13   14.49    1.751  0.30( 0.16) 0.54      73.8     303.00
     2       30.35   12.81    1.877  0.30( 0.30) 1.00      21.1     308.00

 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      235.19   12.46    1.907  0.30( 0.20) 0.66      84.8     300.00
     2      237.34   12.81    1.877  0.30( 0.20) 0.66      87.0     308.00
     3      244.05   14.49    1.751  0.30( 0.19) 0.64      94.9     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     244.05    Tc(MIN.) =    14.49
 EFFECTIVE AREA(ACRES) =      94.86   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =      179.4
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1050.00  DOWNSTREAM(FEET) =  1025.50
 FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  28.91
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     244.05
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   14.72
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.72
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.736
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.80      0.30      0.100     -
 USER-DEFINED               -        2.40      0.30      0.600     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA AREA(ACRES) =     3.20      SUBAREA RUNOFF(CFS) =     4.59
 EFFECTIVE AREA(ACRES) =     98.06   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =      182.6      PEAK FLOW RATE(CFS) =     244.05
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   14.72
 RAINFALL INTENSITY(INCH/HR) =   1.74
 AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.64
 EFFECTIVE STREAM AREA(ACRES) =      98.06
 TOTAL STREAM AREA(ACRES) =     182.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     244.05

****************************************************************************
 FLOW PROCESS FROM NODE    333.10 TO NODE    333.11 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1144.00  DOWNSTREAM(FEET) =   1094.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.892
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.171
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               -        1.00      0.30      1.000     0    9.89
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.68
 TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      1.68
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    333.11 TO NODE    333.20 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1094.00  DOWNSTREAM(FEET) =   1075.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   275.00   CHANNEL SLOPE =  0.0684
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.68
 FLOW VELOCITY(FEET/SEC) =   4.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.06   Tc(MIN.) =   10.95
 LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.20 =     575.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.20 TO NODE    333.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.95
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.051
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        5.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.50     SUBAREA RUNOFF(CFS) =     8.67
 EFFECTIVE AREA(ACRES) =      6.50   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        6.5       PEAK FLOW RATE(CFS) =      10.24

****************************************************************************
 FLOW PROCESS FROM NODE    333.20 TO NODE    333.30 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1075.20  DOWNSTREAM(FEET) =   1032.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   135.00   CHANNEL SLOPE =  0.3200
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      10.24
 FLOW VELOCITY(FEET/SEC.) =  21.90   FLOW DEPTH(FEET) =   0.68
 TRAVEL TIME(MIN.) =   0.10   Tc(MIN.) =   11.05
 LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.30 =     710.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.30 TO NODE    333.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1032.00  DOWNSTREAM ELEVATION(FEET) = 1027.00
 STREET LENGTH(FEET) =   123.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL) =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.25
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.42
   HALFSTREET FLOOD WIDTH(FEET) =   14.57
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.38
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.28
 STREET FLOW TRAVEL TIME(MIN.) =   0.38   Tc(MIN.) =   11.43
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.001
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.60      0.30      0.100     -
 USER-DEFINED                -        0.60      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA AREA(ACRES) =     1.20     SUBAREA RUNOFF(CFS) =     2.01
 EFFECTIVE AREA(ACRES) =      7.70   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.92
 TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =      11.96

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.96
 FLOW VELOCITY(FEET/SEC.) =  5.46   DEPTH*VELOCITY(FT*FT/SEC.) =   2.34
 LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.00 =     833.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   11.43
 RAINFALL INTENSITY(INCH/HR) =   2.00
 AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.92
 EFFECTIVE STREAM AREA(ACRES) =       7.70
 TOTAL STREAM AREA(ACRES) =       7.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.96

 ** CONFLUENCE DATA **
  STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)             (ACRES)    NODE
     1      235.19   12.70     1.886  0.30( 0.20) 0.65      88.0     300.00
     1      237.34   13.04     1.859  0.30( 0.20) 0.65      90.2     308.00
     1      244.05   14.72     1.736  0.30( 0.19) 0.64      98.1     303.00
     2       11.96   11.43     2.001  0.30( 0.28) 0.92       7.7     333.10

 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       238.05   11.43    2.001  0.30( 0.20) 0.68       86.9      333.10
    2       246.35   12.70    1.886  0.30( 0.20) 0.67       95.7      300.00
    3       248.32   13.04    1.859  0.30( 0.20) 0.67       97.9      308.00
    4       254.18   14.72    1.736  0.30( 0.20) 0.66      105.8      303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     254.18    Tc(MIN.) =    14.72
  EFFECTIVE AREA(ACRES) =     105.76   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =      190.3
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1025.50  DOWNSTREAM(FEET) =  1024.00
  FLOW LENGTH(FEET) =   109.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  43.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.65
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     254.18
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   14.83
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   14.83
  RAINFALL INTENSITY(INCH/HR) =   1.73
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.66
  EFFECTIVE STREAM AREA(ACRES) =     105.76
  TOTAL STREAM AREA(ACRES) =     190.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     254.18

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   243.00
  ELEVATION DATA: UPSTREAM(FEET) =   1077.80  DOWNSTREAM(FEET) =   1075.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.680
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.707
  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                  -        0.20      0.30      0.100      0    6.68
  PUBLIC PARK                 -        0.20      0.30      0.850      0   10.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.92

****************************************************************************
  FLOW PROCESS FROM NODE    335.11 TO NODE    335.10 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1075.00  DOWNSTREAM ELEVATION(FEET) = 1070.00
  STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.24
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.77
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.06
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.92
  STREET FLOW TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =    7.85
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.471
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.20      0.30      0.100      -
  USER-DEFINED                -        1.10      0.30      0.850      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.735
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    2.63
  EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.67
  TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       3.47

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =   9.80
  FLOW VELOCITY(FEET/SEC.) =  3.30   DEPTH*VELOCITY(FT*FT/SEC.) =   1.11
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.10 =     458.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.10 TO NODE    335.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1070.00  DOWNSTREAM ELEVATION(FEET) = 1048.00
  STREET LENGTH(FEET) =   588.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.41
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.35
   HALFSTREET FLOOD WIDTH(FEET) =   10.74
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.42
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.57
 STREET FLOW TRAVEL TIME(MIN.) =   2.22   Tc(MIN.) =   10.07
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.149
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.60      0.30      0.100     -
 USER-DEFINED               -        1.60      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
 SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    3.87
 EFFECTIVE AREA(ACRES) =      3.90    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =        3.9       PEAK FLOW RATE(CFS) =       6.85

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  11.99
 FLOW VELOCITY(FEET/SEC.) =  4.64   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.20 =    1046.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.20 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1048.00  DOWNSTREAM(FEET) =  1024.00
 FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.01
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.85
 PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   10.81
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    336.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.81
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.065
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.30      0.30      0.100     -
 USER-DEFINED               -        0.10      0.30      0.850     -
 USER-DEFINED               -        1.50      0.30      0.100     -
 USER-DEFINED               -        1.50      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.453
 SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    5.90
 EFFECTIVE AREA(ACRES) =      7.30   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.56
 TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      12.46

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   10.81
 RAINFALL INTENSITY(INCH/HR) =   2.06
 AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.56
 EFFECTIVE STREAM AREA(ACRES) =       7.30
 TOTAL STREAM AREA(ACRES) =      7.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.46

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1      238.05   11.54    1.990  0.30( 0.20) 0.68      86.9     333.10
     1      246.35   12.81    1.877  0.30( 0.20) 0.67      95.7     300.00
     1      248.32   13.15    1.850  0.30( 0.20) 0.67      97.9     308.00
     1      254.18   14.83    1.729  0.30( 0.20) 0.66     105.8     303.00
     2       12.46   10.81    2.065  0.30( 0.17) 0.56       7.3     335.00

 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      244.73   10.81    2.065  0.30( 0.20) 0.67      88.7     335.00
     2      250.02   11.54    1.990  0.30( 0.20) 0.67      94.2     333.10
     3      257.58   12.81    1.877  0.30( 0.20) 0.67     103.0     300.00
     4      259.36   13.15    1.850  0.30( 0.20) 0.66     105.2     308.00
     5      264.42   14.83    1.729  0.30( 0.20) 0.65     113.1     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     264.42    Tc(MIN.) =    14.83
 EFFECTIVE AREA(ACRES) =     113.06   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.65
 TOTAL AREA(ACRES) =      197.6
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1024.00  DOWNSTREAM(FEET) =   895.30
  FLOW LENGTH(FEET) =   549.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  48.76
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     264.42
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   15.02
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   15.02
  RAINFALL INTENSITY(INCH/HR) =   1.72
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.65
  EFFECTIVE STREAM AREA(ACRES) =     113.06
  TOTAL STREAM AREA(ACRES) =     197.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     264.42

****************************************************************************
  FLOW PROCESS FROM NODE    373.00 TO NODE    373.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =   1018.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.657
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.979
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.20      0.30      1.000     0   11.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.81
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      1.81

****************************************************************************
  FLOW PROCESS FROM NODE    373.10 TO NODE    374.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1018.00  DOWNSTREAM(FEET) =    895.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.3098
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.941
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        1.80      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  15.85
  AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   0.42
  Tc(MIN.) =   12.07
  SUBAREA AREA(ACRES) =     1.80     SUBAREA RUNOFF(CFS) =     2.66
  EFFECTIVE AREA(ACRES) =     3.00     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      3.0      PEAK FLOW RATE(CFS) =      4.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =  17.28
  LONGEST FLOWPATH FROM NODE    373.00 TO NODE    374.00 =     696.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.07
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.941
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        7.30      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     7.30     SUBAREA RUNOFF(CFS) =    10.78
  EFFECTIVE AREA(ACRES) =    10.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =     10.3      PEAK FLOW RATE(CFS) =     15.21

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   12.07
  RAINFALL INTENSITY(INCH/HR) =   1.94
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     10.30
  TOTAL STREAM AREA(ACRES) =     10.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.21

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      244.73   11.00    2.045  0.30( 0.20) 0.67      88.7     335.00
      1      250.02   11.73    1.972  0.30( 0.20) 0.67      94.2     333.10
```

EXISTING CONDITION, DRAINAGE AREA "A"
10-YEAR STORM, EXPECTED VALUE

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     1      257.58   13.00    1.862  0.30( 0.20) 0.67      103.0      300.00
     1      259.36   13.34    1.835  0.30( 0.20) 0.66      105.2      308.00
     1      264.42   15.02    1.717  0.30( 0.20) 0.65      113.1      303.00
     2       15.21   12.07    1.941  0.30( 0.30) 1.00       10.3      373.00

  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      259.47   11.00    2.045  0.30( 0.21) 0.70      98.1      335.00
      2      265.08   11.73    1.972  0.30( 0.21) 0.70     104.2      333.10
      3      267.27   12.07    1.941  0.30( 0.21) 0.70     106.9      373.00
      4      272.06   13.00    1.862  0.30( 0.21) 0.70     113.3      300.00
      5      273.59   13.34    1.835  0.30( 0.21) 0.69     115.5      308.00
      6      277.56   15.02    1.717  0.30( 0.20) 0.68     123.4      303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     277.56    Tc(MIN.) =    15.02
  EFFECTIVE AREA(ACRES) =     123.36   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =      207.9
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    377.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   895.30  DOWNSTREAM(FEET) =   890.00
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  41.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.72
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     277.56
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   15.15
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   15.15
  RAINFALL INTENSITY(INCH/HR) =   1.71
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.68
  EFFECTIVE STREAM AREA(ACRES) =     123.36
  TOTAL STREAM AREA(ACRES) =     207.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     277.56

****************************************************************************
  FLOW PROCESS FROM NODE    375.00 TO NODE    376.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1140.00  DOWNSTREAM(FEET) =   1036.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.544
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.357
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.30      0.30      1.000     0    8.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.41
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      2.41

****************************************************************************
  FLOW PROCESS FROM NODE    376.00 TO NODE    377.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1036.00  DOWNSTREAM(FEET) =    882.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.2034
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.41
  FLOW VELOCITY(FEET/SEC) =   5.66 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =   10.77
  LONGEST FLOWPATH FROM NODE    375.00 TO NODE    377.00 =    1057.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.77
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.069
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        4.70      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =     7.48
  EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       6.0       PEAK FLOW RATE(CFS) =       9.55

****************************************************************************
  FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   10.77
  RAINFALL INTENSITY(INCH/HR) =   2.07
```

```
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.00
 TOTAL STREAM AREA(ACRES) =       6.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.55

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      259.47   11.13    2.032  0.30( 0.21) 0.70      98.1     335.00
     1      265.08   11.86    1.961  0.30( 0.21) 0.70     104.2     333.10
     1      267.27   12.20    1.930  0.30( 0.21) 0.70     106.9     373.00
     1      272.06   13.12    1.852  0.30( 0.21) 0.70     113.3     300.00
     1      273.59   13.46    1.825  0.30( 0.21) 0.69     115.5     308.00
     1      277.56   15.15    1.709  0.30( 0.20) 0.68     123.4     303.00
     2        9.55   10.77    2.069  0.30( 0.30) 1.00       6.0     375.00

 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      265.90   10.77    2.069  0.30( 0.21) 0.72     101.0     375.00
     2      268.83   11.13    2.032  0.30( 0.21) 0.72     104.1     335.00
     3      274.05   11.86    1.961  0.30( 0.21) 0.72     110.2     333.10
     4      276.07   12.20    1.930  0.30( 0.21) 0.71     112.9     373.00
     5      280.44   13.12    1.852  0.30( 0.21) 0.71     119.3     300.00
     6      281.83   13.46    1.825  0.30( 0.21) 0.71     121.5     308.00
     7      285.16   15.15    1.709  0.30( 0.21) 0.70     129.4     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     285.16    Tc(MIN.) =    15.15
 EFFECTIVE AREA(ACRES) =     129.36   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.70
 TOTAL AREA(ACRES) =      213.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    381.00 TO NODE    382.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    992.00  DOWNSTREAM(FEET) =    914.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.282
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.20      0.30     1.000     0    9.05
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.10      0.30     1.000     0    9.05
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.32
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      2.32

****************************************************************************
 FLOW PROCESS FROM NODE    383.10 TO NODE    383.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1022.00  DOWNSTREAM(FEET) =   1008.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.730
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.329
 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                 -        0.50      0.30     0.850     0    8.73
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA RUNOFF(CFS) =      0.93
 TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      0.93

****************************************************************************
 FLOW PROCESS FROM NODE    383.20 TO NODE    383.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    1008.00  DOWNSTREAM(FEET) =     988.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    347.00   CHANNEL SLOPE =  0.0576
 CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    2.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.243
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        2.00      0.30     0.850     -
 USER-DEFINED                -        2.40      0.30     0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.87
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    9.55
 AVERAGE FLOW DEPTH(FEET) =    0.71   TRAVEL TIME(MIN.) =    0.61
 Tc(MIN.) =     9.34
 SUBAREA AREA(ACRES) =     4.40     SUBAREA RUNOFF(CFS) =     7.87
 EFFECTIVE AREA(ACRES) =     4.90    AREA-AVERAGED Fm(INCH/HR) =    0.25
 AREA-AVERAGED Fp(INCH/HR) =    0.30  AREA-AVERAGED Ap =    0.85
 TOTAL AREA(ACRES) =      4.9        PEAK FLOW RATE(CFS) =       8.77

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.89   FLOW VELOCITY(FEET/SEC.) =  11.07
 LONGEST FLOWPATH FROM NODE    383.10 TO NODE    383.00 =     647.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    384.10 TO NODE    384.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

```
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =   1036.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.079
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.60      0.30     1.000     0   10.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.96
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      0.96

**************************************************************************
  FLOW PROCESS FROM NODE    385.10 TO NODE    385.20 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1105.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.896
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.304
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.00      0.30     1.000     0    8.90
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.80
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      1.80

**************************************************************************
  FLOW PROCESS FROM NODE    385.20 TO NODE    385.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    980.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   390.00   CHANNEL SLOPE =  0.3205
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.80
  FLOW VELOCITY(FEET/SEC) =   3.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.68   Tc(MIN.) =   10.58
  LONGEST FLOWPATH FROM NODE    385.10 TO NODE    385.00 =     690.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    385.00 TO NODE    385.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   10.58
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.090
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.30      0.30     1.000     -
  USER-DEFINED                -        2.30      0.30     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    4.19
  EFFECTIVE AREA(ACRES) =    3.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.6       PEAK FLOW RATE(CFS) =      5.80
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =      3.6  TC(MIN.) =     10.58
  EFFECTIVE AREA(ACRES) =    3.60  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =     5.80
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "B", 10-YEAR STORM EXPECTED VALUE    *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XB-10YR.DAT
  TIME/DATE OF STUDY: 18:49 01/03/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
  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) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1207.00  DOWNSTREAM(FEET) =   1142.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.386
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.236
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.80      0.30      1.000     0    9.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.39
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.39

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1142.00  DOWNSTREAM(FEET) =   1136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE =  0.0189
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.39
  FLOW VELOCITY(FEET/SEC) =   2.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     618.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.80
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.966
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.80      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.80      SUBAREA RUNOFF(CFS) =     4.20
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.6       PEAK FLOW RATE(CFS) =        5.40

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1136.00  DOWNSTREAM(FEET) =   1124.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0320
  CHANNEL FLOW THRU SUBAREA(CFS) =      5.40
  FLOW VELOCITY(FEET/SEC) =   3.84 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.63   Tc(MIN.) =   13.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     993.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   13.43
```

EXISTING CONDITION, DRAINAGE AREA "B"
10-YEAR STORM, EXPECTED VALUE

```
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.828
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        1.50      0.30      1.000     -
USER-DEFINED                -        3.50      0.30      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     5.00      SUBAREA RUNOFF(CFS) =     6.88
EFFECTIVE AREA(ACRES) =      8.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       8.6       PEAK FLOW RATE(CFS) =      11.83

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1124.00  DOWNSTREAM(FEET) =   1120.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0148
 CHANNEL FLOW THRU SUBAREA(CFS) =      11.83
 FLOW VELOCITY(FEET/SEC) =   3.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.21   Tc(MIN.) =   14.63
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1223.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.63
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.742
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        4.50      0.30      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     4.50      SUBAREA RUNOFF(CFS) =     5.84
EFFECTIVE AREA(ACRES) =     13.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      17.00

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1120.60  DOWNSTREAM(FEET) =  1052.00
 FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.75
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.00
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   15.10
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1773.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1052.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0718
 CHANNEL FLOW THRU SUBAREA(CFS) =      17.00
 FLOW VELOCITY(FEET/SEC) =   7.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.29   Tc(MIN.) =   16.39
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    2369.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.39
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.634
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        0.10      0.30      1.000     -
USER-DEFINED                -        5.40      0.30      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =     6.61
EFFECTIVE AREA(ACRES) =     18.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       18.6       PEAK FLOW RATE(CFS) =      22.34

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   16.39
 RAINFALL INTENSITY(INCH/HR) =   1.63
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      18.60
 TOTAL STREAM AREA(ACRES) =      18.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      22.34

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1242.00  DOWNSTREAM(FEET) =   1216.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.292
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.015
```

EXISTING CONDITION, DRAINAGE AREA "B"
10-YEAR STORM, EXPECTED VALUE

```
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.70      0.30      1.000     0   11.29
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.08
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.08

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1216.20  DOWNSTREAM(FEET) =   1188.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   460.00   CHANNEL SLOPE =  0.0613
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.08
 FLOW VELOCITY(FEET/SEC) =   3.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.03   Tc(MIN.) =   13.33
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.33
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.836
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        1.60      0.30      1.000     -
 USER-DEFINED                -        0.80      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.40     SUBAREA RUNOFF(CFS) =     3.32
 EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      3.1      PEAK FLOW RATE(CFS) =      4.29

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1188.00  DOWNSTREAM(FEET) =   1107.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.1419
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       4.29
 FLOW VELOCITY(FEET/SEC) =   6.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.46   Tc(MIN.) =   14.79
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1325.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.79
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.732
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        4.80      0.30      1.000     -
 USER-DEFINED                -        2.20      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.00     SUBAREA RUNOFF(CFS) =     9.02
 EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      10.1      PEAK FLOW RATE(CFS) =     13.01

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1107.80  DOWNSTREAM(FEET) =   1082.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE =  0.0956
 CHANNEL FLOW THRU SUBAREA(CFS) =      13.01
 FLOW VELOCITY(FEET/SEC) =   8.27 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.54   Tc(MIN.) =   15.33
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.33
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.697
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        5.70      0.30      1.000     -
 USER-DEFINED                -        0.60      0.30      1.000     -
 USER-DEFINED                -        0.30      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     6.60     SUBAREA RUNOFF(CFS) =     8.30
 EFFECTIVE AREA(ACRES) =     16.70   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      16.7      PEAK FLOW RATE(CFS) =     21.00

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1082.00  DOWNSTREAM(FEET) =  1062.00
 FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.72
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.00
```

EXISTING CONDITION, DRAINAGE AREA "B"
10-YEAR STORM, EXPECTED VALUE

```
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   15.68
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   870.00   CHANNEL SLOPE =  0.0607
 CHANNEL FLOW THRU SUBAREA(CFS) =      21.00
 FLOW VELOCITY(FEET/SEC) =   7.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.94   Tc(MIN.) =   17.62
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.62
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.570
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -       10.30      0.30      1.000     -
 USER-DEFINED                -        2.10      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.40      SUBAREA RUNOFF(CFS) =   14.17
 EFFECTIVE AREA(ACRES) =     29.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       29.1       PEAK FLOW RATE(CFS) =      33.25

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   17.62
 RAINFALL INTENSITY(INCH/HR) =   1.57
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      29.10
 TOTAL STREAM AREA(ACRES) =      29.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      33.25

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       22.34   16.39    1.634  0.30( 0.30) 1.00      18.6       1.00
     2       33.25   17.62    1.570  0.30( 0.30) 1.00      29.1       8.00

 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       54.86   16.39    1.634  0.30( 0.30) 1.00      45.7       1.00
     2       54.51   17.62    1.570  0.30( 0.30) 1.00      47.7       8.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      54.86    Tc(MIN.) =    16.39
 EFFECTIVE AREA(ACRES) =      45.68   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       47.7
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1012.00  DOWNSTREAM(FEET) =    954.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.3222
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      54.86
 FLOW VELOCITY(FEET/SEC.) =  27.09   FLOW DEPTH(FEET) =   0.38
 TRAVEL TIME(MIN.) =   0.11   Tc(MIN.) =   16.50
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     14.00 =    2969.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     82.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    954.00  DOWNSTREAM(FEET) =    917.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0663
 CHANNEL FLOW THRU SUBAREA(CFS) =      54.86
 FLOW VELOCITY(FEET/SEC) =  10.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.91   Tc(MIN.) =   17.41
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     82.00 =    3527.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     82.00 TO NODE     82.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.41
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.580
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.10      0.30      1.000     -
 USER-DEFINED                -       29.30      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   29.40      SUBAREA RUNOFF(CFS) =   33.87
 EFFECTIVE AREA(ACRES) =     75.08   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       77.1       PEAK FLOW RATE(CFS) =      86.49
```

EXISTING CONDITION, DRAINAGE AREA "B"
10-YEAR STORM, EXPECTED VALUE

```
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        77.1  TC(MIN.) =     17.41
  EFFECTIVE AREA(ACRES) =      75.08  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      86.49

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       86.49   17.41    1.580  0.30( 0.30) 1.00      75.1        1.00
      2       84.70   18.64    1.521  0.30( 0.30) 1.00      77.1        8.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                          HUNSAKER & ASSOCIATES
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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "C", 10-YEAR STORM EXPECTED VALUE    *
* PORTOLLA TRACTS 15353 & 17300                                          *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XC-10YR.DAT
  TIME/DATE OF STUDY: 13:48 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
  FLOW PROCESS FROM NODE     113.00 TO NODE     114.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1128.00  DOWNSTREAM(FEET) =   1050.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.282
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                 -        0.40      0.30      1.000     0    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"                 -        0.20      0.30      1.000     0    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.07
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.07

**************************************************************************
  FLOW PROCESS FROM NODE     114.00 TO NODE     115.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   295.00   CHANNEL SLOPE =  0.1695
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.07
  FLOW VELOCITY(FEET/SEC) =   4.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =   10.07
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    115.00 =     595.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     115.00 TO NODE     115.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   10.07
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.149
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                 -        1.40      0.30      1.000     -
  USER-DEFINED                 -        1.60      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.00      SUBAREA RUNOFF(CFS) =     4.99
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.6       PEAK FLOW RATE(CFS) =       5.99

**************************************************************************
  FLOW PROCESS FROM NODE     115.00 TO NODE     116.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    870.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1055.00   CHANNEL SLOPE =  0.1232
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      5.99
  FLOW VELOCITY(FEET/SEC) =   6.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.52   Tc(MIN.) =   12.60
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    116.00 =    1650.00 FEET.

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

EXISTING CONDITION, DRAINAGE AREA "C"
10-YEAR STORM, EXPECTED VALUE

```
 FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.60
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.895
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.40      0.30      1.000     -
 USER-DEFINED                -       13.20      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   13.60      SUBAREA RUNOFF(CFS) =   19.52
 EFFECTIVE AREA(ACRES) =     17.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       17.2       PEAK FLOW RATE(CFS) =      24.69
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       17.2  TC(MIN.) =     12.60
 EFFECTIVE AREA(ACRES) =     17.20  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      24.69
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "D", 10-YEAR STORM EXPECTED VALUE    *
* PORTOLLA TRACTS 15353 & 17300                                          *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XD-10YR.DAT
  TIME/DATE OF STUDY: 18:30 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020    0.67    2.00 0.0312 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

**************************************************************************
  FLOW PROCESS FROM NODE     200.00 TO NODE     201.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1030.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.611
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.347
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.90      0.30      1.000     0    8.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.66
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      1.66

**************************************************************************
  FLOW PROCESS FROM NODE     201.00 TO NODE     202.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1030.00  DOWNSTREAM(FEET) =    990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.1619
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.66
  FLOW VELOCITY(FEET/SEC) =   5.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.79   Tc(MIN.) =    9.40
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     547.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     202.00 TO NODE     202.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    9.40
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.234
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.30      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    4.00
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.2       PEAK FLOW RATE(CFS) =       5.57

**************************************************************************
  FLOW PROCESS FROM NODE     202.00 TO NODE     202.10 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.1250
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      5.57
  FLOW VELOCITY(FEET/SEC) =   6.84 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.78   Tc(MIN.) =   10.18
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.10 =     867.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     202.10 TO NODE     202.10 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

EXISTING CONDITION, DRAINAGE AREA "D"
10-YEAR STORM, EXPECTED VALUE

```
==========================================================================
  MAINLINE Tc(MIN.) =   10.18
  *   5 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
  USER-DEFINED               -        2.20      0.30      1.000     -
  USER-DEFINED               -        0.40      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    4.30
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       5.8       PEAK FLOW RATE(CFS) =       9.59

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1057.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.171
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.265
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               -        0.70      0.30      1.000     0    9.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.24
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.24

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1057.00  DOWNSTREAM(FEET) =   1026.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE =  0.2441
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.24
  FLOW VELOCITY(FEET/SEC) =   4.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    9.60
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.10 =     427.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.60
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.208
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.40      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.69
  EFFECTIVE AREA(ACRES) =      1.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       1.1       PEAK FLOW RATE(CFS) =       1.89

****************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.20 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1026.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   389.00   CHANNEL SLOPE =  0.1954
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.89
  FLOW VELOCITY(FEET/SEC) =   5.38 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.21   Tc(MIN.) =   10.80
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.20 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.20 TO NODE    204.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.80
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.066
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.40      0.30      1.000     -
  USER-DEFINED               -        0.60      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    3.18
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.1       PEAK FLOW RATE(CFS) =       4.93

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1118.00  DOWNSTREAM(FEET) =   1062.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.199
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               -        0.80      0.30      1.000     0    9.67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.37
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.37

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1027.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.3182
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.37
  FLOW VELOCITY(FEET/SEC) =   5.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.36   Tc(MIN.) =   10.03
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    206.10 =     410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.10 TO NODE    206.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.03
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.153
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.50      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =     0.83
  EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       2.17

****************************************************************************
  FLOW PROCESS FROM NODE    206.10 TO NODE    207.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1027.00  DOWNSTREAM(FEET) =    930.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   423.00   CHANNEL SLOPE =  0.2293
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.17
  FLOW VELOCITY(FEET/SEC) =   5.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =   11.31
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =     833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.31
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.014
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.30      0.30      1.000     -
  USER-DEFINED               -        0.60      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.90      SUBAREA RUNOFF(CFS) =     2.93
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.2       PEAK FLOW RATE(CFS) =       4.94

****************************************************************************
  FLOW PROCESS FROM NODE    200.10 TO NODE    200.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1134.00  DOWNSTREAM(FEET) =   1073.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.506
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.220
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               -        1.10      0.30      1.000     0    9.51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.90
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      1.90

****************************************************************************
  FLOW PROCESS FROM NODE    200.20 TO NODE    200.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1073.00  DOWNSTREAM(FEET) =    990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.1137
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.073
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.70      0.30      1.000     -
  USER-DEFINED               -        1.80      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.91
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   1.23
  Tc(MIN.) =   10.73
  SUBAREA AREA(ACRES) =     2.50      SUBAREA RUNOFF(CFS) =     3.99
  EFFECTIVE AREA(ACRES) =      3.60     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.6         PEAK FLOW RATE(CFS) =       5.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =  11.11
```

EXISTING CONDITION, DRAINAGE AREA "D"
10-YEAR STORM, EXPECTED VALUE

```
 LONGEST FLOWPATH FROM NODE    200.10 TO NODE    200.30 =    1030.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   10.73
 RAINFALL INTENSITY(INCH/HR) =   2.07
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       3.60
 TOTAL STREAM AREA(ACRES) =       3.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.75

****************************************************************************
 FLOW PROCESS FROM NODE    200.31 TO NODE    200.32 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1238.00  DOWNSTREAM(FEET) =   1204.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.079
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.40      0.30      1.000     0   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.64
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.64

****************************************************************************
 FLOW PROCESS FROM NODE    200.32 TO NODE    200.33 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1204.00  DOWNSTREAM(FEET) =   1150.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE =  0.3253
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.64
 FLOW VELOCITY(FEET/SEC) =   3.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =   11.55
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.33 =     466.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.33 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.55
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.990
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.20      0.30      1.000     -
 USER-DEFINED                -        0.30      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =     0.76
 EFFECTIVE AREA(ACRES) =      0.90   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       0.9       PEAK FLOW RATE(CFS) =       1.37

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.34 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =   1100.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   159.00   CHANNEL SLOPE =  0.3145
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.37
 FLOW VELOCITY(FEET/SEC) =   5.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =   12.08
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.34 =     625.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.34 TO NODE    200.34 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.08
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.940
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.80      0.30      1.000     -
 USER-DEFINED                -        0.90      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.70      SUBAREA RUNOFF(CFS) =     2.51
 EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       2.6       PEAK FLOW RATE(CFS) =       3.84

****************************************************************************
 FLOW PROCESS FROM NODE    200.34 TO NODE     82.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =   1085.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0791
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.84
 FLOW VELOCITY(FEET/SEC) =   5.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.56   Tc(MIN.) =   12.64
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE     82.10 =     812.00 FEET.

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

```
 FLOW PROCESS FROM NODE      82.10 TO NODE      82.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.64
 *   5 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
 USER-DEFINED                -        2.00      0.30      1.000     -
 USER-DEFINED                -        0.40      0.30      1.000     -
 USER-DEFINED                -        1.10      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     3.50      SUBAREA RUNOFF(CFS) =     5.01
 EFFECTIVE AREA(ACRES) =      6.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =       8.74

****************************************************************************
 FLOW PROCESS FROM NODE      82.10 TO NODE     200.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1085.20  DOWNSTREAM(FEET) =   990.00
 FLOW LENGTH(FEET) =   392.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.98
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        8.74
 PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   12.95
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     200.30 TO NODE     200.30 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.) =   12.95
 RAINFALL INTENSITY(INCH/HR) =   1.87
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.10
 TOTAL STREAM AREA(ACRES) =       6.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.74

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1        5.75   10.73    2.073  0.30( 0.30) 1.00       3.6     200.10
     2        8.74   12.95    1.866  0.30( 0.30) 1.00       6.1     200.31

 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       13.95   10.73    2.073  0.30( 0.30) 1.00       8.7     200.10
     2       13.81   12.95    1.866  0.30( 0.30) 1.00       9.7     200.31

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      13.95    Tc(MIN.) =    10.73
 EFFECTIVE AREA(ACRES) =       8.66   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        9.7
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     200.30 TO NODE     200.40 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    970.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1250
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      13.95
 FLOW VELOCITY(FEET/SEC) =   8.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.31   Tc(MIN.) =   11.04
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.40 =    1364.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     200.40 TO NODE     200.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.04
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.041
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.90      0.30      1.000     -
 USER-DEFINED                -        0.20      0.30      1.000     -
 USER-DEFINED                -        0.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     2.51
 EFFECTIVE AREA(ACRES) =     10.26   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       11.3       PEAK FLOW RATE(CFS) =      16.07

****************************************************************************
 FLOW PROCESS FROM NODE     200.40 TO NODE     200.50 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    970.00  DOWNSTREAM(FEET) =    949.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   156.00   CHANNEL SLOPE =  0.1346
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      16.07
 FLOW VELOCITY(FEET/SEC) =   8.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.29   Tc(MIN.) =   11.33
```

EXISTING CONDITION, DRAINAGE AREA "D"
10-YEAR STORM, EXPECTED VALUE

```
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.50 =    1520.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.50 TO NODE    200.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.33
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.011
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.60      0.30      1.000     -
 USER-DEFINED               -        0.30      0.30      1.000     -
 USER-DEFINED               -        1.20      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    2.10      SUBAREA RUNOFF(CFS) =    3.23
 EFFECTIVE AREA(ACRES) =    12.36   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       13.4       PEAK FLOW RATE(CFS) =      19.03
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       13.4  TC(MIN.) =     11.33
 EFFECTIVE AREA(ACRES) =     12.36  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      19.03

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1       19.03   11.33    2.011  0.30( 0.30) 1.00      12.4      200.10
     2       18.32   13.55    1.819  0.30( 0.30) 1.00      13.4      200.31
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "D"
10-YEAR STORM, EXPECTED VALUE

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, AREAS "E" & "F", 10-YEAR EXPECTED VALUE            *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: X-EF-10.DAT
  TIME/DATE OF STUDY: 19:38 01/23/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)      (FT)   SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   45.0     40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE     400.00 TO NODE     400.10 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1078.00  DOWNSTREAM(FEET) =   1072.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.509
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.746
  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                 -        0.50      0.30      0.850     0   10.34
  COMMERCIAL                  -        0.20      0.30      0.100     0    6.51
  COMMERCIAL                  -        0.20      0.30      0.100     0    6.51
  PUBLIC PARK                 -        0.10      0.30      0.850     0   10.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.550
  SUBAREA RUNOFF(CFS) =      2.32
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.32

**************************************************************************
  FLOW PROCESS FROM NODE     400.10 TO NODE     401.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) = 1072.00  DOWNSTREAM ELEVATION(FEET) = 1058.00
  STREET LENGTH(FEET) =   321.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.17
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =    9.18
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.41
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.44
  STREET FLOW TRAVEL TIME(MIN.) =   1.21   Tc(MIN.) =    7.72
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.495
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.40      0.30      0.850     -
  USER-DEFINED                -        1.10      0.30      0.850     -
  USER-DEFINED                -        0.30      0.30      0.100     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    3.69
  EFFECTIVE AREA(ACRES) =      2.80    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       5.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  10.74
  FLOW VELOCITY(FEET/SEC.) =  4.73   DEPTH*VELOCITY(FT*FT/SEC.) =   1.67
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    401.00 =     621.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     401.00 TO NODE     402.00 IS CODE =  62
--------------------------------------------------------------------------
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
UPSTREAM ELEVATION(FEET) = 1058.00  DOWNSTREAM ELEVATION(FEET) =  990.00
STREET LENGTH(FEET) =   803.00   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 45.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.018
OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.03
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.36
  HALFSTREET FLOOD WIDTH(FEET) =   11.29
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.78
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.47
STREET FLOW TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =    9.70
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.195
SUBAREA LOSS RATE DATA(AMC   II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        0.60      0.30      0.500     -
USER-DEFINED                -        0.20      0.30      0.500     -
USER-DEFINED                -        2.20      0.30      0.850     -
USER-DEFINED                -        0.60      0.30      0.100     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.647
SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    6.48
EFFECTIVE AREA(ACRES) =      6.40    AREA-AVERAGED Fm(INCH/HR) =  0.20
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.65
TOTAL AREA(ACRES) =        6.4        PEAK FLOW RATE(CFS) =      11.52

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  12.62
FLOW VELOCITY(FEET/SEC.) =  7.13   DEPTH*VELOCITY(FT*FT/SEC.) =   2.77
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =    1424.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    9.70
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.195
SUBAREA LOSS RATE DATA(AMC   II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        0.30      0.30      0.850     -
USER-DEFINED                -        0.20      0.30      1.000     -
USER-DEFINED                -        0.60      0.30      0.850     -
USER-DEFINED                -        7.10      0.30      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =   14.03
EFFECTIVE AREA(ACRES) =     14.60   AREA-AVERAGED Fm(INCH/HR) =  0.25
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.84
TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      25.54

****************************************************************************
FLOW PROCESS FROM NODE    500.00 TO NODE    500.10 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    948.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.815
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.180
SUBAREA Tc AND LOSS RATE DATA(AMC   II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"                -        1.30      0.30      1.000     0    9.81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      2.20
TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      2.20

****************************************************************************
FLOW PROCESS FROM NODE    500.10 TO NODE    501.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    948.00  DOWNSTREAM(FEET) =    920.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.1000
CHANNEL FLOW THRU SUBAREA(CFS) =      2.20
FLOW VELOCITY(FEET/SEC) =   5.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.84   Tc(MIN.) =   10.66
LONGEST FLOWPATH FROM NODE    500.00 TO NODE    501.00 =     580.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   10.66
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.082
SUBAREA LOSS RATE DATA(AMC   II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        1.10      0.30      1.000     -
USER-DEFINED                -        0.70      0.30      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    2.89
EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       4.97
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =        3.1  TC(MIN.) =     10.66
```

EXISTING CONDITION, DRAINAGE AREAS "E" & "F"
10-YEAR STORM, EXPECTED VALUE

```
  EFFECTIVE AREA(ACRES) =      3.10  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      4.97
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "A", 25-YEAR STORM EXPECTED VALUE    *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XA-25YR.DAT
  TIME/DATE OF STUDY: 17:14 01/03/2013
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   45.0     40.0    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

************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1132.30  DOWNSTREAM(FEET) =   1088.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.148
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.706
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        2.00      0.30      1.000     0   10.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.33
  TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      4.33

************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1088.30  DOWNSTREAM(FEET) =   1077.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0286
  CHANNEL FLOW THRU SUBAREA(CFS) =      4.33
  FLOW VELOCITY(FEET/SEC) =   3.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.87   Tc(MIN.) =   12.02
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     688.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   12.02
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.456
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        4.60      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.60      SUBAREA RUNOFF(CFS) =     8.92
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       6.6       PEAK FLOW RATE(CFS) =      12.80

************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1077.20  DOWNSTREAM(FEET) =  1073.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.64
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.80
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.18
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

EXISTING CONDITION, DRAINAGE AREA "A"
25-YEAR STORM, EXPECTED VALUE

```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.18
 RAINFALL INTENSITY(INCH/HR) =   2.44
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.60
 TOTAL STREAM AREA(ACRES) =       6.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.80

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN.) =   14.35   RAINFALL INTENSITY(INCH/HR) =  2.22
 EFFECTIVE AREA(ACRES) =    77.94
 TOTAL AREA(ACRES) =   151.43        PEAK FLOW RATE(CFS) =    241.73
 AREA-AVERAGED Fm(INCH/HR) =   0.15  AREA-AVERAGED Fp(INCH/HR) =   0.30
 AREA-AVERAGED Ap =  0.50
 NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
       CONFLUENCE ANALYSES.

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   14.35
 RAINFALL INTENSITY(INCH/HR) =   2.22
 AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =      77.94
 TOTAL STREAM AREA(ACRES) =     151.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     241.73

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       12.80   12.18    2.437  0.30( 0.30) 1.00       6.6     300.00
     2      241.73   14.35    2.219  0.30( 0.15) 0.50      77.9     303.00

 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      239.68   12.18    2.437  0.30( 0.16) 0.55      72.8     300.00
     2      253.23   14.35    2.219  0.30( 0.16) 0.54      84.5     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     253.23    Tc(MIN.) =    14.35
 EFFECTIVE AREA(ACRES) =      84.54   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =      158.0
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1073.00  DOWNSTREAM(FEET) =  1056.00
 FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  30.74
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     253.23
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   14.47
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =    1031.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.47
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.208
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.30      0.30      0.100     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.59
 EFFECTIVE AREA(ACRES) =     84.84   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.54
 TOTAL AREA(ACRES) =      158.3       PEAK FLOW RATE(CFS) =     253.23
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1056.00  DOWNSTREAM(FEET) =  1050.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  40.93
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     253.23
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   14.49
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    307.00 =    1071.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   14.49
 RAINFALL INTENSITY(INCH/HR) =   2.21
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.54
 EFFECTIVE STREAM AREA(ACRES) =      84.84
 TOTAL STREAM AREA(ACRES) =     158.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     253.23

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1103.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.756
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.945
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.80      0.30      1.000     0    8.76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.90
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.90

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1103.00  DOWNSTREAM(FEET) =   1067.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   644.00   CHANNEL SLOPE =  0.0548
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.706
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        3.40      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.59
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.70
 AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   1.39
 Tc(MIN.) =   10.15
 SUBAREA AREA(ACRES) =     3.40      SUBAREA RUNOFF(CFS) =    7.36
 EFFECTIVE AREA(ACRES) =     4.20    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      4.2        PEAK FLOW RATE(CFS) =      9.09

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   9.03
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =     944.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1067.70  DOWNSTREAM(FEET) =   1052.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0177
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.432
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        4.70      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     13.61
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.11
 AVERAGE FLOW DEPTH(FEET) =   0.51   TRAVEL TIME(MIN.) =   2.08
 Tc(MIN.) =   12.23
 SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =    9.02
 EFFECTIVE AREA(ACRES) =     8.90    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      8.9        PEAK FLOW RATE(CFS) =     17.08

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   7.66
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    311.00 =    1831.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.23
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.432
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.70      0.30      1.000     -
 USER-DEFINED                -       11.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.20     SUBAREA RUNOFF(CFS) =   23.41
 EFFECTIVE AREA(ACRES) =    21.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       21.1      PEAK FLOW RATE(CFS) =      40.48

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1051.10  DOWNSTREAM(FEET) =  1050.00
 FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.4 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.97
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      40.48
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   12.46
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   12.46
 RAINFALL INTENSITY(INCH/HR) =   2.41
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      21.10
 TOTAL STREAM AREA(ACRES) =      21.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      40.48

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      239.68   12.33    2.421  0.30( 0.16) 0.54      73.1     300.00
     1      253.23   14.49    2.206  0.30( 0.16) 0.54      84.8     303.00
     2       40.48   12.46    2.406  0.30( 0.30) 1.00      21.1     308.00

 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      280.02   12.33    2.421  0.30( 0.19) 0.64      94.0     300.00
     2      280.99   12.46    2.406  0.30( 0.19) 0.64      94.9     308.00
     3      289.87   14.49    2.206  0.30( 0.19) 0.63     105.9     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     289.87    Tc(MIN.) =    14.49
 EFFECTIVE AREA(ACRES) =     105.94   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.63
 TOTAL AREA(ACRES) =      179.4
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1050.00  DOWNSTREAM(FEET) =  1025.50
 FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  30.18
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     289.87
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   14.71
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.71
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.187
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.80      0.30      0.100     -
 USER-DEFINED                -        2.40      0.30      0.600     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA AREA(ACRES) =     3.20      SUBAREA RUNOFF(CFS) =     5.89
 EFFECTIVE AREA(ACRES) =    109.14   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.63
 TOTAL AREA(ACRES) =      182.6      PEAK FLOW RATE(CFS) =     289.87
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   14.71
 RAINFALL INTENSITY(INCH/HR) =   2.19
 AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.63
 EFFECTIVE STREAM AREA(ACRES) =     109.14
 TOTAL STREAM AREA(ACRES) =     182.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     289.87

****************************************************************************
 FLOW PROCESS FROM NODE    333.10 TO NODE    333.11 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1144.00  DOWNSTREAM(FEET) =   1094.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.892
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.746
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.00      0.30      1.000     0    9.89
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.20
 TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.20
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     333.11 TO NODE     333.20 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    1094.00  DOWNSTREAM(FEET) =    1075.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   275.00   CHANNEL SLOPE =  0.0684
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.20
  FLOW VELOCITY(FEET/SEC) =   4.59 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.00   Tc(MIN.) =   10.89
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.20 =     575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     333.20 TO NODE     333.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.89
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.599
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        5.50      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =    11.38
  EFFECTIVE AREA(ACRES) =      6.50    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =         6.5       PEAK FLOW RATE(CFS) =       13.45

****************************************************************************
  FLOW PROCESS FROM NODE     333.20 TO NODE     333.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    1075.20  DOWNSTREAM(FEET) =    1032.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   135.00   CHANNEL SLOPE =  0.3200
  CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =    1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       13.45
  FLOW VELOCITY(FEET/SEC.) =  23.28   FLOW DEPTH(FEET) =    0.76
  TRAVEL TIME(MIN.) =    0.10   Tc(MIN.) =   10.99
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.30 =     710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     333.30 TO NODE     333.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1032.00  DOWNSTREAM ELEVATION(FEET) = 1027.00
  STREET LENGTH(FEET) =   123.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.74
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.45
    HALFSTREET FLOOD WIDTH(FEET) =   16.37
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.70
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.59
  STREET FLOW TRAVEL TIME(MIN.) =   0.36   Tc(MIN.) =   11.35
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.538
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.60      0.30      0.100     -
  USER-DEFINED                -        0.60      0.30      0.850     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     2.59
  EFFECTIVE AREA(ACRES) =      7.70    AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =         7.7       PEAK FLOW RATE(CFS) =       15.68

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  16.76
  FLOW VELOCITY(FEET/SEC.) =  5.80   DEPTH*VELOCITY(FT*FT/SEC.) =   2.68
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.00 =     833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     333.00 TO NODE     333.00 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.) =   11.35
  RAINFALL INTENSITY(INCH/HR) =   2.54
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.92
  EFFECTIVE STREAM AREA(ACRES) =       7.70
  TOTAL STREAM AREA(ACRES) =      7.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      15.68

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      280.02   12.55    2.395  0.30( 0.19) 0.64      97.2     300.00
      1      280.99   12.68    2.381  0.30( 0.19) 0.64      98.1     308.00
      1      289.87   14.71    2.187  0.30( 0.19) 0.63     109.1     303.00
      2       15.68   11.35    2.538  0.30( 0.28) 0.92       7.7     333.10

  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      285.18   11.35    2.538  0.30( 0.20) 0.66      95.5     333.10
    2      294.71   12.55    2.395  0.30( 0.20) 0.66     104.9     300.00
    3      295.58   12.68    2.381  0.30( 0.20) 0.66     105.8     308.00
    4      303.12   14.71    2.187  0.30( 0.19) 0.64     116.8     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     303.12    Tc(MIN.) =    14.71
  EFFECTIVE AREA(ACRES) =     116.84   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.64
  TOTAL AREA(ACRES) =      190.3
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1025.50  DOWNSTREAM(FEET) =  1024.00
  FLOW LENGTH(FEET) =   109.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  47.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.30
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     303.12
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   14.82
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   14.82
  RAINFALL INTENSITY(INCH/HR) =   2.18
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.64
  EFFECTIVE STREAM AREA(ACRES) =     116.84
  TOTAL STREAM AREA(ACRES) =     190.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     303.12

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   243.00
  ELEVATION DATA: UPSTREAM(FEET) =   1077.80  DOWNSTREAM(FEET) =   1075.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.680
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.439
  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                  -        0.20      0.30      0.100     0    6.68
  PUBLIC PARK                 -        0.20      0.30      0.850     0   10.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA RUNOFF(CFS) =      1.19
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.19

****************************************************************************
  FLOW PROCESS FROM NODE    335.11 TO NODE    335.10 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1075.00  DOWNSTREAM ELEVATION(FEET) = 1070.00
  STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.90
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    8.95
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.03
  STREET FLOW TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =    7.80
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.146
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.20      0.30      0.100     -
  USER-DEFINED                -        1.10      0.30      0.850     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.735
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    3.42
  EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.67
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       4.50

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.05
  FLOW VELOCITY(FEET/SEC.) =  3.50   DEPTH*VELOCITY(FT*FT/SEC.) =   1.26
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.10 =     458.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.10 TO NODE    335.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1070.00  DOWNSTREAM ELEVATION(FEET) = 1048.00
  STREET LENGTH(FEET) =   588.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.03
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.38
   HALFSTREET FLOOD WIDTH(FEET) =   12.15
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.65
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.77
 STREET FLOW TRAVEL TIME(MIN.) =   2.11   Tc(MIN.) =    9.91
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.743
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.60      0.30      0.100     -
 USER-DEFINED                -        1.60      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
 SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    5.05
 EFFECTIVE AREA(ACRES) =      3.90    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =       8.94

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.48
 FLOW VELOCITY(FEET/SEC.) =  4.92   DEPTH*VELOCITY(FT*FT/SEC.) =   1.98
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.20 =    1046.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.20 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1048.00  DOWNSTREAM(FEET) =  1024.00
 FLOW LENGTH(FEET) =   490.00   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.) =  11.82
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.94
 PIPE TRAVEL TIME(MIN.) =   0.69    Tc(MIN.) =   10.60
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    336.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.60
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.639
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.30      0.30      0.100     -
 USER-DEFINED                -        0.10      0.30      0.850     -
 USER-DEFINED                -        1.50      0.30      0.100     -
 USER-DEFINED                -        1.50      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.453
 SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    7.66
 EFFECTIVE AREA(ACRES) =      7.30   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.56
 TOTAL AREA(ACRES) =        7.3        PEAK FLOW RATE(CFS) =      16.23

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   10.60
 RAINFALL INTENSITY(INCH/HR) =   2.64
 AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.56
 EFFECTIVE STREAM AREA(ACRES) =       7.30
 TOTAL STREAM AREA(ACRES) =       7.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.23

 ** CONFLUENCE DATA **
  STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)             (ACRES)    NODE
     1      285.18   11.45     2.525  0.30( 0.20) 0.66       95.5      333.10
     1      294.71   12.66     2.384  0.30( 0.20) 0.66      104.9      300.00
     1      295.58   12.79     2.370  0.30( 0.20) 0.66      105.8      308.00
     1      303.12   14.82     2.178  0.30( 0.19) 0.64      116.8      303.00
     2       16.23   10.60     2.639  0.30( 0.17) 0.56        7.3      335.00

 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      293.15   10.60     2.639  0.30( 0.20) 0.65       95.7      335.00
     2      300.66   11.45     2.525  0.30( 0.20) 0.65      102.8      333.10
     3      309.27   12.66     2.384  0.30( 0.20) 0.65      112.2      300.00
     4      310.04   12.79     2.370  0.30( 0.20) 0.65      113.1      308.00
     5      316.33   14.82     2.178  0.30( 0.19) 0.64      124.1      303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     316.33    Tc(MIN.) =    14.82
 EFFECTIVE AREA(ACRES) =     124.14   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =      197.6
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1024.00  DOWNSTREAM(FEET) =   895.30
  FLOW LENGTH(FEET) =   549.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  51.16
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     316.33
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   15.00
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   15.00
  RAINFALL INTENSITY(INCH/HR) =   2.16
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.64
  EFFECTIVE STREAM AREA(ACRES) =     124.14
  TOTAL STREAM AREA(ACRES) =     197.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     316.33

****************************************************************************
  FLOW PROCESS FROM NODE    373.00 TO NODE    373.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =   1018.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.657
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.499
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.20      0.30      1.000     0   11.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.38
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      2.38

****************************************************************************
  FLOW PROCESS FROM NODE    373.10 TO NODE    374.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1018.00  DOWNSTREAM(FEET) =    895.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.3098
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.453
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        1.80      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  17.08
  AVERAGE FLOW DEPTH(FEET) =   0.49   TRAVEL TIME(MIN.) =   0.39
  Tc(MIN.) =   12.04
  SUBAREA AREA(ACRES) =     1.80     SUBAREA RUNOFF(CFS) =     3.49
  EFFECTIVE AREA(ACRES) =     3.00     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      3.0      PEAK FLOW RATE(CFS) =      5.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.56   FLOW VELOCITY(FEET/SEC.) =  18.55
  LONGEST FLOWPATH FROM NODE    373.00 TO NODE    374.00 =     696.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   12.04
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.453
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        7.30      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     7.30     SUBAREA RUNOFF(CFS) =    14.15
  EFFECTIVE AREA(ACRES) =    10.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      10.3      PEAK FLOW RATE(CFS) =      19.96

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   12.04
  RAINFALL INTENSITY(INCH/HR) =   2.45
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     10.30
  TOTAL STREAM AREA(ACRES) =     10.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.96

  ** CONFLUENCE DATA **
   STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)             (ACRES)    NODE
      1      293.15   10.78    2.613  0.30( 0.20) 0.65      95.7     335.00
      1      300.66   11.64    2.501  0.30( 0.20) 0.65     102.8     333.10
      1      309.27   12.84    2.365  0.30( 0.20) 0.65     112.2     300.00
```

```
     1      310.04   12.97    2.351  0.30( 0.20) 0.65      113.1      308.00
     1      316.33   15.00    2.163  0.30( 0.19) 0.64      124.1      303.00
     2       19.96   12.04    2.453  0.30( 0.30) 1.00       10.3      373.00

  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      312.35   10.78    2.613  0.30( 0.21) 0.68      104.9      335.00
      2      320.39   11.64    2.501  0.30( 0.21) 0.69      112.8      333.10
      3      323.52   12.04    2.453  0.30( 0.21) 0.68      116.3      373.00
      4      328.41   12.84    2.365  0.30( 0.20) 0.68      122.5      300.00
      5      329.06   12.97    2.351  0.30( 0.20) 0.68      123.4      308.00
      6      333.60   15.00    2.163  0.30( 0.20) 0.67      134.4      303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     333.60    Tc(MIN.) =    15.00
  EFFECTIVE AREA(ACRES) =     134.44   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.67
  TOTAL AREA(ACRES) =      207.9
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    377.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   895.30  DOWNSTREAM(FEET) =   890.00
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  41.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.21
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     333.60
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   15.11
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   15.11
  RAINFALL INTENSITY(INCH/HR) =   2.15
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.67
  EFFECTIVE STREAM AREA(ACRES) =     134.44
  TOTAL STREAM AREA(ACRES) =     207.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     333.60

****************************************************************************
  FLOW PROCESS FROM NODE    375.00 TO NODE    376.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1140.00  DOWNSTREAM(FEET) =   1036.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.544
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.986
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.30      0.30      1.000     0    8.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.14
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.14

****************************************************************************
  FLOW PROCESS FROM NODE    376.00 TO NODE    377.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1036.00  DOWNSTREAM(FEET) =    882.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.2034
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.14
  FLOW VELOCITY(FEET/SEC) =   6.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.10   Tc(MIN.) =   10.65
  LONGEST FLOWPATH FROM NODE    375.00 TO NODE    377.00 =    1057.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.65
  *  10 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
  USER-DEFINED                -        4.70      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =     9.87
  EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      6.0       PEAK FLOW RATE(CFS) =      12.60

****************************************************************************
  FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   10.65
  RAINFALL INTENSITY(INCH/HR) =   2.63
  AREA-AVERAGED Fm(INCH/HR) =  0.30
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.00
 TOTAL STREAM AREA(ACRES) =       6.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.60

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      312.35   10.90    2.597  0.30( 0.21) 0.68     104.9     335.00
     1      320.39   11.76    2.487  0.30( 0.21) 0.69     112.8     333.10
     1      323.52   12.16    2.439  0.30( 0.21) 0.68     116.3     373.00
     1      328.41   12.96    2.352  0.30( 0.20) 0.68     122.5     300.00
     1      329.06   13.09    2.339  0.30( 0.20) 0.68     123.4     308.00
     1      333.60   15.11    2.154  0.30( 0.20) 0.67     134.4     303.00
     2       12.60   10.65    2.633  0.30( 0.30) 1.00       6.0     375.00

 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      322.13   10.65    2.633  0.30( 0.21) 0.70     108.4     375.00
     2      324.75   10.90    2.597  0.30( 0.21) 0.70     110.9     335.00
     3      332.20   11.76    2.487  0.30( 0.21) 0.70     118.8     333.10
     4      335.07   12.16    2.439  0.30( 0.21) 0.70     122.3     373.00
     5      339.49   12.96    2.352  0.30( 0.21) 0.70     128.5     300.00
     6      340.07   13.09    2.339  0.30( 0.21) 0.70     129.4     308.00
     7      343.61   15.11    2.154  0.30( 0.20) 0.68     140.4     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     343.61    Tc(MIN.) =    15.11
 EFFECTIVE AREA(ACRES) =     140.44   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.68
 TOTAL AREA(ACRES) =      213.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    381.00 TO NODE    382.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    992.00  DOWNSTREAM(FEET) =    914.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.20      0.30      1.000     0    9.05
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.10      0.30      1.000     0    9.05
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.03
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.03

****************************************************************************
 FLOW PROCESS FROM NODE    383.10 TO NODE    383.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1022.00  DOWNSTREAM(FEET) =   1008.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.730
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.950
 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                 -        0.50      0.30      0.850     0    8.73
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA RUNOFF(CFS) =      1.21
 TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.21

****************************************************************************
 FLOW PROCESS FROM NODE    383.20 TO NODE    383.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1008.00  DOWNSTREAM(FEET) =    988.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   347.00   CHANNEL SLOPE =  0.0576
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.845
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        2.00      0.30      0.850     -
 USER-DEFINED                -        2.40      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.34
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.15
 AVERAGE FLOW DEPTH(FEET) =   0.79   TRAVEL TIME(MIN.) =   0.57
 Tc(MIN.) =    9.30
 SUBAREA AREA(ACRES) =     4.40      SUBAREA RUNOFF(CFS) =   10.26
 EFFECTIVE AREA(ACRES) =     4.90     AREA-AVERAGED Fm(INCH/HR) =   0.25
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.85
 TOTAL AREA(ACRES) =      4.9       PEAK FLOW RATE(CFS) =      11.42

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.99   FLOW VELOCITY(FEET/SEC.) =  11.72
 LONGEST FLOWPATH FROM NODE    383.10 TO NODE    383.00 =     647.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    384.10 TO NODE    384.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.627
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.60      0.30     1.000      0   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.26
 TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.26

****************************************************************************
 FLOW PROCESS FROM NODE    385.10 TO NODE    385.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1105.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.896
 *  10 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.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.00      0.30     1.000      0    8.90
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.36
 TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.36

****************************************************************************
 FLOW PROCESS FROM NODE    385.20 TO NODE    385.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    980.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   390.00   CHANNEL SLOPE =  0.3205
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.36
 FLOW VELOCITY(FEET/SEC) =   4.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.54   Tc(MIN.) =   10.44
 LONGEST FLOWPATH FROM NODE    385.10 TO NODE    385.00 =     690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    385.00 TO NODE    385.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.44
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.663
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
```

```
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.30      0.30     1.000      -
 USER-DEFINED               -        2.30      0.30     1.000      -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     5.53
 EFFECTIVE AREA(ACRES) =     3.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      3.6       PEAK FLOW RATE(CFS) =       7.66
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       3.6  TC(MIN.) =     10.44
 EFFECTIVE AREA(ACRES) =     3.60  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      7.66
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "A"
25-YEAR STORM, EXPECTED VALUE

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "B", 25-YEAR STORM EXPECTED VALUE    *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XB-25YR.DAT
  TIME/DATE OF STUDY: 18:43 01/03/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

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

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

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1207.00  DOWNSTREAM(FEET) =   1142.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.386
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.830
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.80      0.30      1.000     0    9.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.82
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.82

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1142.00  DOWNSTREAM(FEET) =   1136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE =  0.0189
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.82
  FLOW VELOCITY(FEET/SEC) =   2.32 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.29   Tc(MIN.) =   11.67
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     618.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.67
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.498
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.80      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.80     SUBAREA RUNOFF(CFS) =     5.54
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.6      PEAK FLOW RATE(CFS) =       7.12

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1136.00  DOWNSTREAM(FEET) =   1124.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0320
  CHANNEL FLOW THRU SUBAREA(CFS) =      7.12
  FLOW VELOCITY(FEET/SEC) =   4.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.52   Tc(MIN.) =   13.19
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     993.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   13.19
```

EXISTING CONDITION, DRAINAGE AREA "B"
25-YEAR STORM, EXPECTED VALUE

```
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.328
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        1.50      0.30      1.000     -
 USER-DEFINED                -        3.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.00      SUBAREA RUNOFF(CFS) =     9.13
 EFFECTIVE AREA(ACRES) =      8.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       8.6       PEAK FLOW RATE(CFS) =      15.70

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1124.00  DOWNSTREAM(FEET) =   1120.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0148
 CHANNEL FLOW THRU SUBAREA(CFS) =      15.70
 FLOW VELOCITY(FEET/SEC) =   3.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =   14.32
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1223.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.32
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.222
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        4.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.50      SUBAREA RUNOFF(CFS) =     7.78
 EFFECTIVE AREA(ACRES) =     13.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      22.66

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1120.60  DOWNSTREAM(FEET) =  1052.00
 FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.16
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      22.66
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   14.75
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1773.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1052.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0718
 CHANNEL FLOW THRU SUBAREA(CFS) =      22.66
 FLOW VELOCITY(FEET/SEC) =   8.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.20   Tc(MIN.) =   15.95
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    2369.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.95
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.089
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.10      0.30      1.000     -
 USER-DEFINED                -        5.40      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =     8.85
 EFFECTIVE AREA(ACRES) =     18.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       18.6       PEAK FLOW RATE(CFS) =      29.94

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   15.95
 RAINFALL INTENSITY(INCH/HR) =   2.09
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      18.60
 TOTAL STREAM AREA(ACRES) =      18.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      29.94

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1242.00  DOWNSTREAM(FEET) =   1216.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.292
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.545
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
```

EXISTING CONDITION, DRAINAGE AREA "B"
25-YEAR STORM, EXPECTED VALUE

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"                -        0.70      0.30      1.000     0   11.29
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      1.41
TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.41

****************************************************************************
FLOW PROCESS FROM NODE       9.00 TO NODE      10.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1216.20  DOWNSTREAM(FEET) =   1188.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   460.00   CHANNEL SLOPE =  0.0613
CHANNEL FLOW THRU SUBAREA(CFS) =       1.41
FLOW VELOCITY(FEET/SEC) =   3.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.93   Tc(MIN.) =   13.22
LONGEST FLOWPATH FROM NODE       8.00 TO NODE      10.00 =     760.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      10.00 TO NODE      10.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   13.22
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.325
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        1.60      0.30      1.000     -
USER-DEFINED                -        0.80      0.30      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     2.40      SUBAREA RUNOFF(CFS) =     4.37
EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       5.65

****************************************************************************
FLOW PROCESS FROM NODE      10.00 TO NODE      11.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1188.00  DOWNSTREAM(FEET) =   1107.80
CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.1419
NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       5.65
FLOW VELOCITY(FEET/SEC) =   6.87 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.37   Tc(MIN.) =   14.59
LONGEST FLOWPATH FROM NODE       8.00 TO NODE      11.00 =    1325.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      11.00 TO NODE      11.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   14.59
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.197
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        4.80      0.30      1.000     -
USER-DEFINED                -        2.20      0.30      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     7.00      SUBAREA RUNOFF(CFS) =    11.95
EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       10.1       PEAK FLOW RATE(CFS) =      17.25

****************************************************************************
FLOW PROCESS FROM NODE      11.00 TO NODE      12.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1107.80  DOWNSTREAM(FEET) =   1082.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE =  0.0956
CHANNEL FLOW THRU SUBAREA(CFS) =       17.25
FLOW VELOCITY(FEET/SEC) =   8.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =   15.10
LONGEST FLOWPATH FROM NODE       8.00 TO NODE      12.00 =    1595.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      12.00 TO NODE      12.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   15.10
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.155
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        5.70      0.30      1.000     -
USER-DEFINED                -        0.60      0.30      1.000     -
USER-DEFINED                -        0.30      0.30      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     6.60      SUBAREA RUNOFF(CFS) =    11.02
EFFECTIVE AREA(ACRES) =     16.70   AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       16.7       PEAK FLOW RATE(CFS) =      27.88

****************************************************************************
FLOW PROCESS FROM NODE      12.00 TO NODE      13.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1082.00  DOWNSTREAM(FEET) =  1062.00
FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  17.03
ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      27.88
PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   15.42
```

```
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   870.00   CHANNEL SLOPE =  0.0607
 CHANNEL FLOW THRU SUBAREA(CFS) =      27.88
 FLOW VELOCITY(FEET/SEC) =   8.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.79   Tc(MIN.) =   17.21
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.21
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.999
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -       10.30      0.30      1.000     -
 USER-DEFINED                -        2.10      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.40      SUBAREA RUNOFF(CFS) =   18.97
 EFFECTIVE AREA(ACRES) =     29.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       29.1       PEAK FLOW RATE(CFS) =      44.51

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   17.21
 RAINFALL INTENSITY(INCH/HR) =   2.00
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      29.10
 TOTAL STREAM AREA(ACRES) =      29.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      44.51

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       29.94   15.95    2.089  0.30( 0.30) 1.00      18.6       1.00
     2       44.51   17.21    1.999  0.30( 0.30) 1.00      29.1       8.00

 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       73.35   15.95    2.089  0.30( 0.30) 1.00      45.6       1.00
     2       72.96   17.21    1.999  0.30( 0.30) 1.00      47.7       8.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      73.35    Tc(MIN.) =    15.95
 EFFECTIVE AREA(ACRES) =      45.56   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      47.7
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1012.00  DOWNSTREAM(FEET) =    954.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.3222
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      73.35
 FLOW VELOCITY(FEET/SEC.) =  30.11   FLOW DEPTH(FEET) =   0.45
 TRAVEL TIME(MIN.) =   0.10   Tc(MIN.) =   16.04
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     14.00 =    2969.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     82.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    954.00  DOWNSTREAM(FEET) =    917.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0663
 CHANNEL FLOW THRU SUBAREA(CFS) =      73.35
 FLOW VELOCITY(FEET/SEC) =  11.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.83   Tc(MIN.) =   16.88
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     82.00 =    3527.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     82.00 TO NODE     82.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.88
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.022
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.10      0.30      1.000     -
 USER-DEFINED                -       29.30      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   29.40      SUBAREA RUNOFF(CFS) =   45.56
 EFFECTIVE AREA(ACRES) =     74.96   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       77.1       PEAK FLOW RATE(CFS) =     116.16
============================================================================
```

```
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       77.1  TC(MIN.) =     16.88
 EFFECTIVE AREA(ACRES) =     74.96  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =     116.16

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      116.16   16.88    2.022  0.30( 0.30) 1.00      75.0       1.00
     2      113.78   18.15    1.940  0.30( 0.30) 1.00      77.1       8.00
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "C", 25-YEAR STORM EXPECTED VALUE    *
* PORTOLLA TRACTS 15353 & 17300                                          *
* W.O. #3751-1                                                           *
 **************************************************************************

  FILE NAME: XC-25YR.DAT
  TIME/DATE OF STUDY: 13:34 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
  FLOW PROCESS FROM NODE     113.00 TO NODE     114.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1128.00  DOWNSTREAM(FEET) =   1050.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.40      0.30      1.000    83    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.20      0.30      1.000    83    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.40
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.40

**************************************************************************
  FLOW PROCESS FROM NODE     114.00 TO NODE     115.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   295.00   CHANNEL SLOPE =  0.1695
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.40
  FLOW VELOCITY(FEET/SEC) =   5.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   10.02
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    115.00 =     595.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     115.00 TO NODE     115.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   10.02
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.725
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        1.40      0.30      1.000    -
  USER-DEFINED                -        1.60      0.30      1.000    -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.00     SUBAREA RUNOFF(CFS) =     6.55
  EFFECTIVE AREA(ACRES) =     3.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.6      PEAK FLOW RATE(CFS) =      7.86

**************************************************************************
  FLOW PROCESS FROM NODE     115.00 TO NODE     116.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    870.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1055.00   CHANNEL SLOPE =  0.1232
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.86
  FLOW VELOCITY(FEET/SEC) =   7.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.36   Tc(MIN.) =   12.38
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    116.00 =    1650.00 FEET.

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

EXISTING CONDITION, DRAINAGE AREA "C"
25-YEAR STORM, EXPECTED VALUE

```
 FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.38
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.414
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.40      0.30      1.000     -
 USER-DEFINED                -       13.20      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   13.60      SUBAREA RUNOFF(CFS) =   25.88
 EFFECTIVE AREA(ACRES) =     17.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       17.2       PEAK FLOW RATE(CFS) =      32.73
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       17.2  TC(MIN.) =     12.38
 EFFECTIVE AREA(ACRES) =     17.20  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      32.73
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "D", 25-YEAR STORM EXPECTED VALUE    *
* PORTOLLA TRACTS 15353 & 17300                                          *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XD-25YR.DAT
  TIME/DATE OF STUDY: 18:26 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1030.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.611
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.973
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.90      0.30      1.000     0    8.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.17
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      2.17

**************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1030.00  DOWNSTREAM(FEET) =    990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.1619
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.17
  FLOW VELOCITY(FEET/SEC) =   5.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    9.36
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     547.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    9.36
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.835
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.30      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.30     SUBAREA RUNOFF(CFS) =     5.25
  EFFECTIVE AREA(ACRES) =     3.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.2      PEAK FLOW RATE(CFS) =      7.30

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.10 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.1250
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.30
  FLOW VELOCITY(FEET/SEC) =   7.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.73   Tc(MIN.) =   10.09
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.10 =     867.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    202.10 TO NODE    202.10 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

EXISTING CONDITION, DRAINAGE AREA "D"
25-YEAR STORM, EXPECTED VALUE

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================================================================================
  MAINLINE Tc(MIN.) =   10.09
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.716
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.20      0.30      1.000     -
  USER-DEFINED               -        0.40      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     5.65
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      12.61

********************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1057.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.171
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.868
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               -        0.70      0.30      1.000     0    9.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.62
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.62

********************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1057.00  DOWNSTREAM(FEET) =   1026.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE =  0.2441
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.62
  FLOW VELOCITY(FEET/SEC) =   5.21 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =    9.58
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.10 =     427.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.10 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    9.58
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.797
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.40      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     0.90
  EFFECTIVE AREA(ACRES) =      1.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =      2.47

********************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.20 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1026.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   389.00   CHANNEL SLOPE =  0.1954
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.47
  FLOW VELOCITY(FEET/SEC) =   5.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.14   Tc(MIN.) =   10.72
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.20 =     816.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    204.20 TO NODE    204.20 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.623
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.40      0.30      1.000     -
  USER-DEFINED               -        0.60      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.00      SUBAREA RUNOFF(CFS) =     4.18
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =      6.48

********************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1118.00  DOWNSTREAM(FEET) =   1062.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.782
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               -        0.80      0.30      1.000     0    9.67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
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  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.79
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.79

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1027.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.3182
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.79
  FLOW VELOCITY(FEET/SEC) =   5.32 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.34   Tc(MIN.) =   10.02
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    206.10 =     410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.10 TO NODE    206.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.02
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.727
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.50      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =     1.09
  EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       2.84

****************************************************************************
  FLOW PROCESS FROM NODE    206.10 TO NODE    207.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1027.00  DOWNSTREAM(FEET) =    930.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   423.00   CHANNEL SLOPE =  0.2293
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.84
  FLOW VELOCITY(FEET/SEC) =   5.87 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.20   Tc(MIN.) =   11.22
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =     833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.22
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.555
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.30      0.30      1.000     -
  USER-DEFINED               -        0.60      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.90      SUBAREA RUNOFF(CFS) =     3.86
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.2       PEAK FLOW RATE(CFS) =       6.49

****************************************************************************
  FLOW PROCESS FROM NODE    200.10 TO NODE    200.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1134.00  DOWNSTREAM(FEET) =   1073.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.506
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.809
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               -        1.10      0.30      1.000     0    9.51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.48
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      2.48

****************************************************************************
  FLOW PROCESS FROM NODE    200.20 TO NODE    200.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1073.00  DOWNSTREAM(FEET) =    990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.1137
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.632
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.70      0.30      1.000     -
  USER-DEFINED               -        1.80      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.66
  AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   1.14
  Tc(MIN.) =   10.65
  SUBAREA AREA(ACRES) =     2.50      SUBAREA RUNOFF(CFS) =     5.25
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.6       PEAK FLOW RATE(CFS) =       7.56

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.27   FLOW VELOCITY(FEET/SEC.) =  12.24
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 LONGEST FLOWPATH FROM NODE    200.10 TO NODE    200.30 =    1030.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   10.65
 RAINFALL INTENSITY(INCH/HR) =   2.63
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       3.60
 TOTAL STREAM AREA(ACRES) =       3.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.56

****************************************************************************
 FLOW PROCESS FROM NODE    200.31 TO NODE    200.32 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1238.00  DOWNSTREAM(FEET) =   1204.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.627
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.40      0.30     1.000      0   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.84
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.84

****************************************************************************
 FLOW PROCESS FROM NODE    200.32 TO NODE    200.33 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1204.00  DOWNSTREAM(FEET) =   1150.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE =  0.3253
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.84
 FLOW VELOCITY(FEET/SEC) =   3.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =   11.55
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.33 =     466.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.33 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.55
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.512
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.20      0.30     1.000      -
 USER-DEFINED                -        0.30      0.30     1.000      -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50     SUBAREA RUNOFF(CFS) =     1.00
 EFFECTIVE AREA(ACRES) =      0.90   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       0.9       PEAK FLOW RATE(CFS) =       1.79

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.34 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =   1100.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   159.00   CHANNEL SLOPE =  0.3145
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.79
 FLOW VELOCITY(FEET/SEC) =   5.32 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   12.05
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.34 =     625.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.34 TO NODE    200.34 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.05
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.452
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.80      0.30     1.000      -
 USER-DEFINED                -        0.90      0.30     1.000      -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.70     SUBAREA RUNOFF(CFS) =     3.29
 EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       2.6       PEAK FLOW RATE(CFS) =       5.04

****************************************************************************
 FLOW PROCESS FROM NODE    200.34 TO NODE     82.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =   1085.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0791
 CHANNEL FLOW THRU SUBAREA(CFS) =       5.04
 FLOW VELOCITY(FEET/SEC) =   5.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =   12.57
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE     82.10 =     812.00 FEET.

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

```
 FLOW PROCESS FROM NODE     82.10 TO NODE     82.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.57
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.393
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        2.00      0.30      1.000     -
 USER-DEFINED                -        0.40      0.30      1.000     -
 USER-DEFINED                -        1.10      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     3.50      SUBAREA RUNOFF(CFS) =     6.59
 EFFECTIVE AREA(ACRES) =      6.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =      11.49

****************************************************************************
 FLOW PROCESS FROM NODE     82.10 TO NODE    200.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1085.20  DOWNSTREAM(FEET) =   990.00
 FLOW LENGTH(FEET) =   392.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.68
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.49
 PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   12.86
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   12.86
 RAINFALL INTENSITY(INCH/HR) =   2.36
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.10
 TOTAL STREAM AREA(ACRES) =       6.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.49

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1        7.56   10.65    2.632  0.30( 0.30) 1.00       3.6     200.10
     2       11.49   12.86    2.362  0.30( 0.30) 1.00       6.1     200.31

 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       18.32   10.65    2.632  0.30( 0.30) 1.00       8.7     200.10
     2       18.17   12.86    2.362  0.30( 0.30) 1.00       9.7     200.31

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      18.32    Tc(MIN.) =    10.65
 EFFECTIVE AREA(ACRES) =       8.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        9.7
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.40 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    970.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1250
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      18.32
 FLOW VELOCITY(FEET/SEC) =   9.25 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.29   Tc(MIN.) =   10.94
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.40 =    1364.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.40 TO NODE    200.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.94
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.592
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.90      0.30      1.000     -
 USER-DEFINED                -        0.20      0.30      1.000     -
 USER-DEFINED                -        0.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     3.30
 EFFECTIVE AREA(ACRES) =     10.25   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       11.3       PEAK FLOW RATE(CFS) =      21.15

****************************************************************************
 FLOW PROCESS FROM NODE    200.40 TO NODE    200.50 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    970.00  DOWNSTREAM(FEET) =    949.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   156.00   CHANNEL SLOPE =  0.1346
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      21.15
 FLOW VELOCITY(FEET/SEC) =   9.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.27   Tc(MIN.) =   11.21
```

EXISTING CONDITION, DRAINAGE AREA "D"
25-YEAR STORM, EXPECTED VALUE

```
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.50 =    1520.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.50 TO NODE    200.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.21
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.556
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.60      0.30      1.000     -
 USER-DEFINED               -        0.30      0.30      1.000     -
 USER-DEFINED               -        1.20      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    2.10      SUBAREA RUNOFF(CFS) =    4.26
 EFFECTIVE AREA(ACRES) =     12.35   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       13.4       PEAK FLOW RATE(CFS) =      25.08
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       13.4  TC(MIN.) =     11.21
 EFFECTIVE AREA(ACRES) =     12.35  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      25.08

 ** PEAK FLOW RATE TABLE **
  STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
    1       25.08   11.21    2.556  0.30( 0.30) 1.00       12.4      200.10
    2       24.19   13.42    2.305  0.30( 0.30) 1.00       13.4      200.31
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, AREAS "E" & "F", 25-YEAR EXPECTED VALUE            *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 **************************************************************************

  FILE NAME: X-EF-25.DAT
  TIME/DATE OF STUDY: 19:32 01/23/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   45.0     40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE     400.00 TO NODE     400.10 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1078.00  DOWNSTREAM(FEET) =   1072.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.509
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.490
  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                 -        0.50      0.30      0.850     0   10.34
  COMMERCIAL                  -        0.20      0.30      0.100     0    6.51
  COMMERCIAL                  -        0.20      0.30      0.100     0    6.51
  PUBLIC PARK                 -        0.10      0.30      0.850     0   10.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.550
  SUBAREA RUNOFF(CFS) =      2.99
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.99

**************************************************************************
  FLOW PROCESS FROM NODE     400.10 TO NODE     401.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) = 1072.00  DOWNSTREAM ELEVATION(FEET) = 1058.00
  STREET LENGTH(FEET) =   321.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   10.35
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.69
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.63
  STREET FLOW TRAVEL TIME(MIN.) =   1.14   Tc(MIN.) =    7.65
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.182
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.40      0.30      0.850     -
  USER-DEFINED                -        1.10      0.30      0.850     -
  USER-DEFINED                -        0.30      0.30      0.100     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
  SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =     4.80
  EFFECTIVE AREA(ACRES) =      2.80    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        2.8        PEAK FLOW RATE(CFS) =       7.52

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.07
  FLOW VELOCITY(FEET/SEC.) =  5.03   DEPTH*VELOCITY(FT*FT/SEC.) =   1.90
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE     401.00 =      621.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     401.00 TO NODE     402.00 IS CODE =  62
--------------------------------------------------------------------------
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
UPSTREAM ELEVATION(FEET) = 1058.00  DOWNSTREAM ELEVATION(FEET) =  990.00
STREET LENGTH(FEET) =   803.00   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 45.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.018
OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.76
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.39
  HALFSTREET FLOOD WIDTH(FEET) =   12.70
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.20
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.80
STREET FLOW TRAVEL TIME(MIN.) =   1.86   Tc(MIN.) =    9.51
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.809
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        0.60      0.30      0.500     -
USER-DEFINED                -        0.20      0.30      0.500     -
USER-DEFINED                -        2.20      0.30      0.850     -
USER-DEFINED                -        0.60      0.30      0.100     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.647
SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    8.47
EFFECTIVE AREA(ACRES) =      6.40    AREA-AVERAGED Fm(INCH/HR) =  0.20
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.65
TOTAL AREA(ACRES) =        6.4        PEAK FLOW RATE(CFS) =      15.05

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.10
FLOW VELOCITY(FEET/SEC.) =  7.64   DEPTH*VELOCITY(FT*FT/SEC.) =   3.17
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =    1424.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    9.51
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.809
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        0.30      0.30      0.850     -
USER-DEFINED                -        0.20      0.30      1.000     -
USER-DEFINED                -        0.60      0.30      0.850     -
USER-DEFINED                -        7.10      0.30      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =   18.55
EFFECTIVE AREA(ACRES) =     14.60   AREA-AVERAGED Fm(INCH/HR) =  0.25
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.84
TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      33.60

****************************************************************************
FLOW PROCESS FROM NODE    500.00 TO NODE    500.10 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    948.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.815
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.758
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"                -        1.30      0.30      1.000     0    9.81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      2.88
TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      2.88

****************************************************************************
FLOW PROCESS FROM NODE    500.10 TO NODE    501.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    948.00  DOWNSTREAM(FEET) =    920.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.1000
CHANNEL FLOW THRU SUBAREA(CFS) =      2.88
FLOW VELOCITY(FEET/SEC) =   5.88 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.79   Tc(MIN.) =   10.61
LONGEST FLOWPATH FROM NODE    500.00 TO NODE    501.00 =     580.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   10.61
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.638
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        1.10      0.30      1.000     -
USER-DEFINED                -        0.70      0.30      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    3.79
EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       6.52
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =        3.1  TC(MIN.) =     10.61
```

EXISTING CONDITION, DRAINAGE AREAS "E" & "F"
25-YEAR STORM, EXPECTED VALUE

```
  EFFECTIVE AREA(ACRES) =       3.10  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       6.52
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "A", 50-YEAR STORM EXPECTED VALUE    *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 **************************************************************************

  FILE NAME: XA-50YR.DAT
  TIME/DATE OF STUDY: 17:41 01/03/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   15.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
   1)    5.00;  4.440
   2)   10.00;  3.010
   3)   15.00;  2.390
   4)   20.00;  2.030
   5)   25.00;  1.790
   6)   30.00;  1.600
   7)   40.00;  1.370
   8)   50.00;  1.200
   9)   60.00;  1.060
  10)   90.00;  0.860
  11)  120.00;  0.730
  12)  180.00;  0.590
  13)  360.00;  0.410
  14) 1200.00;  0.200
  *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   45.0     40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1132.30  DOWNSTREAM(FEET) =   1088.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.148
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.992
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        2.00     0.30      1.000     0   10.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.85
  TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      4.85

**************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1088.30  DOWNSTREAM(FEET) =   1077.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0286
  CHANNEL FLOW THRU SUBAREA(CFS) =      4.85
  FLOW VELOCITY(FEET/SEC) =   3.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.83   Tc(MIN.) =   11.97
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     688.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.97
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.765
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        4.60     0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.60     SUBAREA RUNOFF(CFS) =   10.21
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      14.64

**************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1077.20  DOWNSTREAM(FEET) =  1073.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.97
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.64
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.13
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.13
  RAINFALL INTENSITY(INCH/HR) =   2.75
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.60
  TOTAL STREAM AREA(ACRES) =       6.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.64

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   14.35   RAINFALL INTENSITY(INCH/HR) =  2.47
  EFFECTIVE AREA(ACRES) =    85.38
  TOTAL AREA(ACRES) =   151.43        PEAK FLOW RATE(CFS) =    264.79
  AREA-AVERAGED Fm(INCH/HR) =   0.15  AREA-AVERAGED Fp(INCH/HR) =   0.30
  AREA-AVERAGED Ap =  0.50
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   14.35
  RAINFALL INTENSITY(INCH/HR) =   2.47
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      85.38
  TOTAL STREAM AREA(ACRES) =     151.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     264.79

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1       14.64   12.13    2.746  0.30( 0.30) 1.00       6.6      300.00
      2      264.79   14.35    2.471  0.30( 0.15) 0.50      85.4      303.00

  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      265.03   12.13    2.746  0.30( 0.16) 0.54      78.8      300.00
      2      277.78   14.35    2.471  0.30( 0.16) 0.54      92.0      303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     277.78    Tc(MIN.) =    14.35
  EFFECTIVE AREA(ACRES) =      91.98   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =      158.0
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.00  DOWNSTREAM(FEET) =  1056.00
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.92
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     277.78
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   14.47
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =    1031.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.47
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.456
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.30      0.30      0.100     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.30       SUBAREA RUNOFF(CFS) =     0.65
  EFFECTIVE AREA(ACRES) =     92.28   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =      158.3       PEAK FLOW RATE(CFS) =     277.78
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =  1056.00  DOWNSTREAM(FEET) =  1050.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  41.47
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     277.78
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   14.49
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    307.00 =    1071.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   14.49
 RAINFALL INTENSITY(INCH/HR) =   2.45
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.53
 EFFECTIVE STREAM AREA(ACRES) =      92.28
 TOTAL STREAM AREA(ACRES) =     158.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     277.78

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1103.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.756
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.366
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.80      0.30      1.000     0    8.76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.21
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.21

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1103.00  DOWNSTREAM(FEET) =   1067.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   644.00   CHANNEL SLOPE =  0.0548
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  15 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
 USER-DEFINED                -        3.40      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.34
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.10
 AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   1.32
 Tc(MIN.) =   10.08
 SUBAREA AREA(ACRES) =     3.40       SUBAREA RUNOFF(CFS) =    8.26
 EFFECTIVE AREA(ACRES) =     4.20     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      4.2          PEAK FLOW RATE(CFS) =      10.21

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   9.50
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =     944.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1067.70  DOWNSTREAM(FEET) =   1052.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0177
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.752
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        4.70      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.40
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.38
 AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   2.00
 Tc(MIN.) =   12.08
 SUBAREA AREA(ACRES) =     4.70       SUBAREA RUNOFF(CFS) =   10.37
 EFFECTIVE AREA(ACRES) =     8.90     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      8.9          PEAK FLOW RATE(CFS) =      19.64

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.63   FLOW VELOCITY(FEET/SEC.) =   7.93
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    311.00 =    1831.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.08
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.752
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.70      0.30      1.000     -
 USER-DEFINED                -       11.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.20      SUBAREA RUNOFF(CFS) =   26.92
 EFFECTIVE AREA(ACRES) =     21.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       21.1       PEAK FLOW RATE(CFS) =      46.56

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1051.10  DOWNSTREAM(FEET) =  1050.00
 FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.10
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      46.56
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   12.31
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   12.31
 RAINFALL INTENSITY(INCH/HR) =   2.72
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      21.10
 TOTAL STREAM AREA(ACRES) =      21.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      46.56

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      265.03   12.27    2.729  0.30( 0.16) 0.54      79.1     300.00
     1      277.78   14.49    2.454  0.30( 0.16) 0.53      92.3     303.00
     2       46.56   12.31    2.724  0.30( 0.30) 1.00      21.1     308.00

 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      311.53   12.27    2.729  0.30( 0.19) 0.64      100.1     300.00
     2      311.82   12.31    2.724  0.30( 0.19) 0.64      100.4     308.00
     3      319.16   14.49    2.454  0.30( 0.19) 0.62      113.4     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     319.16    Tc(MIN.) =    14.49
 EFFECTIVE AREA(ACRES) =     113.38   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.62
 TOTAL AREA(ACRES) =      179.4
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1050.00  DOWNSTREAM(FEET) =  1025.50
 FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  37.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  30.53
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     319.16
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   14.70
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.70
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.427
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                 -        0.80      0.30      0.100     -
 USER-DEFINED                 -        2.40      0.30      0.600     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA AREA(ACRES) =    3.20      SUBAREA RUNOFF(CFS) =    6.58
 EFFECTIVE AREA(ACRES) =    116.58   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.62
 TOTAL AREA(ACRES) =      182.6       PEAK FLOW RATE(CFS) =     319.16
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   14.70
 RAINFALL INTENSITY(INCH/HR) =   2.43
 AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.62
 EFFECTIVE STREAM AREA(ACRES) =     116.58
 TOTAL STREAM AREA(ACRES) =     182.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     319.16

****************************************************************************
 FLOW PROCESS FROM NODE    333.10 TO NODE    333.11 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   1144.00  DOWNSTREAM(FEET) =   1094.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.892
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.041
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                 -       1.00      0.30      1.000     0    9.89
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.47
 TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.47

****************************************************************************
 FLOW PROCESS FROM NODE    333.11 TO NODE    333.20 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1094.00  DOWNSTREAM(FEET) =   1075.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   275.00   CHANNEL SLOPE =  0.0684
 CHANNEL FLOW THRU SUBAREA(CFS) =      2.47
 FLOW VELOCITY(FEET/SEC) =   4.70 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   10.87
 LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.20 =     575.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.20 TO NODE    333.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.87
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.903
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                 -       5.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =   12.88
 EFFECTIVE AREA(ACRES) =     6.50   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      6.5       PEAK FLOW RATE(CFS) =      15.23

****************************************************************************
 FLOW PROCESS FROM NODE    333.20 TO NODE    333.30 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1075.20  DOWNSTREAM(FEET) =   1032.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   135.00   CHANNEL SLOPE =  0.3200
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      15.23
 FLOW VELOCITY(FEET/SEC.) =  24.01   FLOW DEPTH(FEET) =   0.80
 TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =   10.96
 LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.30 =     710.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    333.30 TO NODE    333.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1032.00  DOWNSTREAM ELEVATION(FEET) = 1027.00
 STREET LENGTH(FEET) =   123.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     16.69
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.47
   HALFSTREET FLOOD WIDTH(FEET) =   17.23
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.87
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.76
 STREET FLOW TRAVEL TIME(MIN.) =   0.35   Tc(MIN.) =   11.31
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.848
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                 -       0.60      0.30      0.100     -
 USER-DEFINED                 -       0.60      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.92
 EFFECTIVE AREA(ACRES) =     7.70    AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.92
 TOTAL AREA(ACRES) =      7.7        PEAK FLOW RATE(CFS) =      17.83

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.70
 FLOW VELOCITY(FEET/SEC.) =  5.96   DEPTH*VELOCITY(FT*FT/SEC.) =   2.85
 LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.00 =     833.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   11.31
 RAINFALL INTENSITY(INCH/HR) =   2.85
 AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.92
 EFFECTIVE STREAM AREA(ACRES) =      7.70
 TOTAL STREAM AREA(ACRES) =      7.70
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.83

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      311.53   12.49    2.702  0.30( 0.19) 0.63      103.3     300.00
     1      311.82   12.53    2.696  0.30( 0.19) 0.63      103.6     308.00
     1      319.16   14.70    2.427  0.30( 0.19) 0.62      116.6     303.00
     2       17.83   11.31    2.848  0.30( 0.28) 0.92        7.7     333.10

 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      316.37   11.31    2.848  0.30( 0.20) 0.65      101.3     333.10
     2      328.34   12.49    2.702  0.30( 0.20) 0.65      111.0     300.00
     3      328.60   12.53    2.696  0.30( 0.20) 0.65      111.3     308.00
     4      334.06   14.70    2.427  0.30( 0.19) 0.64      124.3     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     334.06    Tc(MIN.) =    14.70
 EFFECTIVE AREA(ACRES) =     124.28   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =      190.3
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1025.50  DOWNSTREAM(FEET) =  1024.00
 FLOW LENGTH(FEET) =   109.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  48.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.79
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     334.06
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   14.81
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   14.81
 RAINFALL INTENSITY(INCH/HR) =   2.41
 AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.64
 EFFECTIVE STREAM AREA(ACRES) =     124.28
 TOTAL STREAM AREA(ACRES) =     190.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     334.06

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    335.11 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   243.00
 ELEVATION DATA: UPSTREAM(FEET) =   1077.80  DOWNSTREAM(FEET) =   1075.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.680
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.959
 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                 -        0.20      0.30      0.100     0    6.68
 PUBLIC PARK                -        0.20      0.30      0.850     0   10.61
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA RUNOFF(CFS) =      1.37
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.37

****************************************************************************
 FLOW PROCESS FROM NODE    335.11 TO NODE    335.10 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1075.00  DOWNSTREAM ELEVATION(FEET) = 1070.00
 STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.38
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =    9.65
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.30
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
 STREET FLOW TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =    7.77
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.649
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.20      0.30      0.100     -
 USER-DEFINED               -        1.10      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.735
 SUBAREA AREA(ACRES) =     1.30      SUBAREA RUNOFF(CFS) =    4.01
 EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       5.27
```

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 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  11.84
 FLOW VELOCITY(FEET/SEC.) =  3.65   DEPTH*VELOCITY(FT*FT/SEC.) =   1.36
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.10 =     458.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.10 TO NODE    335.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1070.00  DOWNSTREAM ELEVATION(FEET) = 1048.00
 STREET LENGTH(FEET) =   588.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.13
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.39
   HALFSTREET FLOOD WIDTH(FEET) =   12.93
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.82
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.90
 STREET FLOW TRAVEL TIME(MIN.) =   2.03   Tc(MIN.) =    9.80
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.067
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.60      0.30      0.100     -
 USER-DEFINED               -        1.60      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
 SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    5.69
 EFFECTIVE AREA(ACRES) =      3.90    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =      10.07

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.18
 FLOW VELOCITY(FEET/SEC.) =  5.06   DEPTH*VELOCITY(FT*FT/SEC.) =   2.11
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.20 =    1046.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.20 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1048.00  DOWNSTREAM(FEET) =  1024.00
 FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.20
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.07
 PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   10.47
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    336.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.47
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.952
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.30      0.30      0.100     -
 USER-DEFINED               -        0.10      0.30      0.850     -
 USER-DEFINED               -        1.50      0.30      0.100     -
 USER-DEFINED               -        1.50      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.453
 SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    8.62
 EFFECTIVE AREA(ACRES) =      7.30   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.56
 TOTAL AREA(ACRES) =        7.3        PEAK FLOW RATE(CFS) =      18.28

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   10.47
 RAINFALL INTENSITY(INCH/HR) =   2.95
 AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.56
 EFFECTIVE STREAM AREA(ACRES) =       7.30
 TOTAL STREAM AREA(ACRES) =      7.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      18.28

 ** CONFLUENCE DATA **
  STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1      316.37   11.41    2.835  0.30( 0.20) 0.65      101.3      333.10
     1      328.34   12.59    2.689  0.30( 0.20) 0.65      111.0      300.00
     1      328.60   12.63    2.684  0.30( 0.20) 0.65      111.3      308.00
     1      334.06   14.81    2.414  0.30( 0.19) 0.64      124.3      303.00
     2       18.28   10.47    2.952  0.30( 0.17) 0.56        7.3      335.00

 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      321.37   10.47    2.952  0.30( 0.19) 0.65      100.2      335.00
     2      333.89   11.41    2.835  0.30( 0.19) 0.65      108.6      333.10
```

```
     3      344.90   12.59    2.689  0.30( 0.19) 0.65      118.3      300.00
     4      345.12   12.63    2.684  0.30( 0.19) 0.65      118.6      308.00
     5      348.81   14.81    2.414  0.30( 0.19) 0.63      131.6      303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     348.81    Tc(MIN.) =    14.81
  EFFECTIVE AREA(ACRES) =     131.58   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =      197.6
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1024.00  DOWNSTREAM(FEET) =   895.30
  FLOW LENGTH(FEET) =   549.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  51.87
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     348.81
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   14.98
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   14.98
  RAINFALL INTENSITY(INCH/HR) =   2.39
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.63
  EFFECTIVE STREAM AREA(ACRES) =     131.58
  TOTAL STREAM AREA(ACRES) =     197.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     348.81

****************************************************************************
  FLOW PROCESS FROM NODE    373.00 TO NODE    373.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =   1018.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.657
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.805
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.20      0.30     1.000      0   11.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.70
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      2.70

****************************************************************************
  FLOW PROCESS FROM NODE    373.10 TO NODE    374.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1018.00  DOWNSTREAM(FEET) =    895.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.3098
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.758
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        1.80      0.30     1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.70
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  17.77
  AVERAGE FLOW DEPTH(FEET) =   0.51   TRAVEL TIME(MIN.) =   0.37
  Tc(MIN.) =   12.03
  SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =     3.98
  EFFECTIVE AREA(ACRES) =     3.00     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      3.0       PEAK FLOW RATE(CFS) =      6.64

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =  19.42
  LONGEST FLOWPATH FROM NODE    373.00 TO NODE    374.00 =     696.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.03
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.758
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        7.30      0.30     1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     7.30      SUBAREA RUNOFF(CFS) =    16.15
  EFFECTIVE AREA(ACRES) =    10.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      10.3       PEAK FLOW RATE(CFS) =      22.79

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   12.03
 RAINFALL INTENSITY(INCH/HR) =   2.76
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      10.30
 TOTAL STREAM AREA(ACRES) =      10.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      22.79

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1      321.37   10.65     2.930  0.30( 0.19) 0.65      100.2      335.00
     1      333.89   11.59     2.813  0.30( 0.19) 0.65      108.6      333.10
     1      344.90   12.77     2.667  0.30( 0.19) 0.65      118.3      300.00
     1      345.12   12.81     2.662  0.30( 0.19) 0.65      118.6      308.00
     1      348.81   14.98     2.392  0.30( 0.19) 0.63      131.6      303.00
     2       22.79   12.03     2.758  0.30( 0.30) 1.00       10.3      373.00

 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      342.95   10.65     2.930  0.30( 0.20) 0.68      109.3      335.00
     2      356.33   11.59     2.813  0.30( 0.20) 0.68      118.5      333.10
     3      360.77   12.03     2.758  0.30( 0.20) 0.68      122.5      373.00
     4      366.84   12.77     2.667  0.30( 0.20) 0.67      128.6      300.00
     5      367.02   12.81     2.662  0.30( 0.20) 0.67      128.9      308.00
     6      368.21   14.98     2.392  0.30( 0.20) 0.66      141.9      303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     368.21    Tc(MIN.) =    14.98
 EFFECTIVE AREA(ACRES) =     141.88   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =      207.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    377.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   895.30  DOWNSTREAM(FEET) =   890.00
 FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.46
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     368.21
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   15.10
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   15.10
 RAINFALL INTENSITY(INCH/HR) =   2.38
 AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.66
 EFFECTIVE STREAM AREA(ACRES) =     141.88
 TOTAL STREAM AREA(ACRES) =     207.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     368.21

****************************************************************************
 FLOW PROCESS FROM NODE    375.00 TO NODE    376.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1140.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.544
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -       1.30     0.30      1.000      0    8.54
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.66
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.66

****************************************************************************
 FLOW PROCESS FROM NODE    376.00 TO NODE    377.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1036.00  DOWNSTREAM(FEET) =    882.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.2034
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      3.66
 FLOW VELOCITY(FEET/SEC) =   6.21 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.03   Tc(MIN.) =   10.58
 LONGEST FLOWPATH FROM NODE    375.00 TO NODE    377.00 =    1057.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.58
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.938
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -       4.70     0.30      1.000      -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =   11.16
```

```
 EFFECTIVE AREA(ACRES) =       6.00   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         6.0       PEAK FLOW RATE(CFS) =       14.25

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   10.58
 RAINFALL INTENSITY(INCH/HR) =   2.94
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.00
 TOTAL STREAM AREA(ACRES) =       6.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.25

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      342.95   10.76    2.915  0.30( 0.20) 0.68      109.3     335.00
     1      356.33   11.71    2.798  0.30( 0.20) 0.68      118.5     333.10
     1      360.77   12.14    2.744  0.30( 0.20) 0.68      122.5     373.00
     1      366.84   12.88    2.652  0.30( 0.20) 0.67      128.6     300.00
     1      367.02   12.93    2.647  0.30( 0.20) 0.67      128.9     308.00
     1      368.21   15.10    2.383  0.30( 0.20) 0.66      141.9     303.00
     2       14.25   10.58    2.938  0.30( 0.30) 1.00        6.0     375.00

 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      354.10   10.58    2.938  0.30( 0.21) 0.69      113.4     375.00
     2      357.07   10.76    2.915  0.30( 0.21) 0.69      115.3     335.00
     3      369.82   11.71    2.798  0.30( 0.21) 0.69      124.5     333.10
     4      373.97   12.14    2.744  0.30( 0.21) 0.69      128.5     373.00
     5      379.54   12.88    2.652  0.30( 0.21) 0.69      134.6     300.00
     6      379.69   12.93    2.647  0.30( 0.21) 0.69      134.9     308.00
     7      379.46   15.10    2.383  0.30( 0.20) 0.67      147.9     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     379.69    Tc(MIN.) =    12.93
 EFFECTIVE AREA(ACRES) =     134.92   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.69
 TOTAL AREA(ACRES) =      213.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    381.00 TO NODE    382.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    992.00  DOWNSTREAM(FEET) =    914.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.282
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.20      0.30      1.000     0    9.05
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.10      0.30      1.000     0    9.05
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.49
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.49

****************************************************************************
 FLOW PROCESS FROM NODE    383.10 TO NODE    383.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1022.00  DOWNSTREAM(FEET) =   1008.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.730
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.373
 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                 -        0.50      0.30      0.850     0    8.73
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA RUNOFF(CFS) =      1.40
 TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.40

****************************************************************************
 FLOW PROCESS FROM NODE    383.20 TO NODE    383.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1008.00  DOWNSTREAM(FEET) =    988.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   347.00   CHANNEL SLOPE =  0.0576
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.217
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        2.00      0.30      0.850     -
 USER-DEFINED                -        2.40      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.27
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.58
 AVERAGE FLOW DEPTH(FEET) =   0.83   TRAVEL TIME(MIN.) =   0.55
 Tc(MIN.) =    9.28
```

```
 SUBAREA AREA(ACRES) =      4.40       SUBAREA RUNOFF(CFS) =    11.73
 EFFECTIVE AREA(ACRES) =      4.90     AREA-AVERAGED Fm(INCH/HR) =   0.25
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.85
 TOTAL AREA(ACRES) =        4.9          PEAK FLOW RATE(CFS) =      13.06

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.03   FLOW VELOCITY(FEET/SEC.) =  12.20
 LONGEST FLOWPATH FROM NODE    383.10 TO NODE    383.00 =     647.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    384.10 TO NODE    384.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.925
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.60      0.30     1.000      0   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.42
 TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.42

****************************************************************************
 FLOW PROCESS FROM NODE    385.10 TO NODE    385.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1105.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.896
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.326
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.00      0.30     1.000      0    8.90
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.72
 TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.72

****************************************************************************
 FLOW PROCESS FROM NODE    385.20 TO NODE    385.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    980.00

 CHANNEL LENGTH THRU SUBAREA(FEET) =   390.00   CHANNEL SLOPE =  0.3205
 CHANNEL FLOW THRU SUBAREA(CFS) =      2.72
 FLOW VELOCITY(FEET/SEC) =   4.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.47   Tc(MIN.) =   10.36
 LONGEST FLOWPATH FROM NODE    385.10 TO NODE    385.00 =     690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    385.00 TO NODE    385.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.36
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.965
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.30      0.30     1.000      -
 USER-DEFINED                -        2.30      0.30     1.000      -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     6.24
 EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =       8.63
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        3.6  TC(MIN.) =     10.36
 EFFECTIVE AREA(ACRES) =      3.60  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       8.63
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "B", 50-YEAR STORM EXPECTED VALUE    *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 **************************************************************************

  FILE NAME: XB-50YR.DAT
  TIME/DATE OF STUDY: 18:59 01/03/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   15.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
   1)    5.00;  4.440
   2)   10.00;  3.010
   3)   15.00;  2.390
   4)   20.00;  2.030
   5)   25.00;  1.790
   6)   30.00;  1.600
   7)   40.00;  1.370
   8)   50.00;  1.200
   9)   60.00;  1.060
  10)   90.00;  0.860
  11)  120.00;  0.730
  12)  180.00;  0.590
  13)  360.00;  0.410
  14) 1200.00;  0.200
  *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

**************************************************************************
  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) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1207.00  DOWNSTREAM(FEET) =   1142.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.386
  *  15 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.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.80      0.30      1.000     0    9.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.08
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.08

**************************************************************************
  FLOW PROCESS FROM NODE       2.00 TO NODE       3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1142.00  DOWNSTREAM(FEET) =   1136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE =  0.0189
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.08
  FLOW VELOCITY(FEET/SEC) =   2.38 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.22   Tc(MIN.) =   11.61
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     618.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.61
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.810
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.80      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.80      SUBAREA RUNOFF(CFS) =     6.33
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.6       PEAK FLOW RATE(CFS) =       8.13

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       4.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
```

```
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1136.00  DOWNSTREAM(FEET) =   1124.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0320
 CHANNEL FLOW THRU SUBAREA(CFS) =       8.13
 FLOW VELOCITY(FEET/SEC) =   4.25 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.47   Tc(MIN.) =   13.08
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     993.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.08
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.628
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        1.50      0.30      1.000     -
 USER-DEFINED                -        3.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.00      SUBAREA RUNOFF(CFS) =   10.48
 EFFECTIVE AREA(ACRES) =      8.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       8.6       PEAK FLOW RATE(CFS) =      18.02

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1124.00  DOWNSTREAM(FEET) =   1120.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0148
 CHANNEL FLOW THRU SUBAREA(CFS) =      18.02
 FLOW VELOCITY(FEET/SEC) =   3.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.08   Tc(MIN.) =   14.16
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1223.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.16
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.494
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        4.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.50      SUBAREA RUNOFF(CFS) =    8.88
 EFFECTIVE AREA(ACRES) =     13.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      25.86

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1120.60  DOWNSTREAM(FEET) =  1052.00
 FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.77
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      25.86
 PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   14.59
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1773.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1052.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0718
 CHANNEL FLOW THRU SUBAREA(CFS) =      25.86
 FLOW VELOCITY(FEET/SEC) =   8.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.15   Tc(MIN.) =   15.74
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    2369.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.74
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.337
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.10      0.30      1.000     -
 USER-DEFINED                -        5.40      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =   10.08
 EFFECTIVE AREA(ACRES) =     18.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       18.6       PEAK FLOW RATE(CFS) =      34.10

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   15.74
 RAINFALL INTENSITY(INCH/HR) =   2.34
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      18.60
 TOTAL STREAM AREA(ACRES) =      18.60
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      34.10

****************************************************************************
 FLOW PROCESS FROM NODE       8.00 TO NODE       9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1242.00  DOWNSTREAM(FEET) =   1216.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.292
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.850
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                 -        0.70      0.30      1.000     0   11.29
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.61
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.61

****************************************************************************
 FLOW PROCESS FROM NODE       9.00 TO NODE      10.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1216.20  DOWNSTREAM(FEET) =   1188.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   460.00   CHANNEL SLOPE =  0.0613
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.61
 FLOW VELOCITY(FEET/SEC) =   4.07 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.88   Tc(MIN.) =   13.17
 LONGEST FLOWPATH FROM NODE       8.00 TO NODE      10.00 =     760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      10.00 TO NODE      10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.17
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.616
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                 -        1.60      0.30      1.000     -
 USER-DEFINED                 -        0.80      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.40     SUBAREA RUNOFF(CFS) =     5.00
 EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       6.46

****************************************************************************
 FLOW PROCESS FROM NODE      10.00 TO NODE      11.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1188.00  DOWNSTREAM(FEET) =   1107.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.1419
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       6.46
 FLOW VELOCITY(FEET/SEC) =   7.09 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.33   Tc(MIN.) =   14.50
 LONGEST FLOWPATH FROM NODE       8.00 TO NODE      11.00 =    1325.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      11.00 TO NODE      11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.50
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.452
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                 -        4.80      0.30      1.000     -
 USER-DEFINED                 -        2.20      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.00     SUBAREA RUNOFF(CFS) =    13.56
 EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       10.1       PEAK FLOW RATE(CFS) =      19.56

****************************************************************************
 FLOW PROCESS FROM NODE      11.00 TO NODE      12.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1107.80  DOWNSTREAM(FEET) =   1082.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE =  0.0956
 CHANNEL FLOW THRU SUBAREA(CFS) =      19.56
 FLOW VELOCITY(FEET/SEC) =   9.21 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.49   Tc(MIN.) =   14.99
 LONGEST FLOWPATH FROM NODE       8.00 TO NODE      12.00 =    1595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      12.00 TO NODE      12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.99
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.391
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                 -        5.70      0.30      1.000     -
 USER-DEFINED                 -        0.60      0.30      1.000     -
 USER-DEFINED                 -        0.30      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     6.60     SUBAREA RUNOFF(CFS) =    12.42
 EFFECTIVE AREA(ACRES) =     16.70   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
```

```
 TOTAL AREA(ACRES) =      16.7      PEAK FLOW RATE(CFS) =      31.43

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1082.00  DOWNSTREAM(FEET) =  1062.00
 FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.40
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      31.43
 PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   15.30
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   870.00   CHANNEL SLOPE =  0.0607
 CHANNEL FLOW THRU SUBAREA(CFS) =      31.43
 FLOW VELOCITY(FEET/SEC) =   8.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.73   Tc(MIN.) =   17.04
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.04
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.243
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -       10.30      0.30      1.000     -
 USER-DEFINED                -        2.10      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.40      SUBAREA RUNOFF(CFS) =   21.69
 EFFECTIVE AREA(ACRES) =     29.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       29.1      PEAK FLOW RATE(CFS) =      50.90

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   17.04
 RAINFALL INTENSITY(INCH/HR) =   2.24
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      29.10
 TOTAL STREAM AREA(ACRES) =      29.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      50.90

 ** CONFLUENCE DATA **
  STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       34.10   15.74    2.337  0.30( 0.30) 1.00       18.6        1.00
     2       50.90   17.04    2.243  0.30( 0.30) 1.00       29.1        8.00

 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       83.38   15.74    2.337  0.30( 0.30) 1.00       45.5        1.00
     2       83.44   17.04    2.243  0.30( 0.30) 1.00       47.7        8.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      83.44    Tc(MIN.) =    17.04
 EFFECTIVE AREA(ACRES) =      47.70   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       47.7
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1012.00  DOWNSTREAM(FEET) =    954.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.3222
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      83.44
 FLOW VELOCITY(FEET/SEC.) =  31.33   FLOW DEPTH(FEET) =   0.49
 TRAVEL TIME(MIN.) =   0.10   Tc(MIN.) =   17.13
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     14.00 =    2969.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     82.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    954.00  DOWNSTREAM(FEET) =    917.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0663
 CHANNEL FLOW THRU SUBAREA(CFS) =      83.44
 FLOW VELOCITY(FEET/SEC) =  11.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.80   Tc(MIN.) =   17.93
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     82.00 =    3527.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     82.00 TO NODE     82.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
  MAINLINE Tc(MIN.) =   17.93
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.179
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.10      0.30      1.000     -
  USER-DEFINED                -       29.30      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   29.40      SUBAREA RUNOFF(CFS) =   49.71
  EFFECTIVE AREA(ACRES) =     77.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       77.1       PEAK FLOW RATE(CFS) =     130.37

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      132.92   16.64    2.272  0.30( 0.30) 1.00      74.9       1.00
      2      130.37   17.93    2.179  0.30( 0.30) 1.00      77.1       8.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     132.92  Tc(MIN.) =   16.64
  AREA-AVERAGED Fm(INCH/HR) =  0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =      74.89
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       77.1  TC(MIN.) =     16.64
  EFFECTIVE AREA(ACRES) =     74.89  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =     132.92

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      132.92   16.64    2.272  0.30( 0.30) 1.00      74.9       1.00
      2      130.37   17.93    2.179  0.30( 0.30) 1.00      77.1       8.00
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "D", 50-YEAR STORM EXPECTED VALUE    *
* PORTOLLA TRACTS 15353 & 17300                                          *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XD-50YR.DAT
  TIME/DATE OF STUDY: 18:22 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   15.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
    1)    5.00;  4.440
    2)   10.00;  3.010
    3)   15.00;  2.390
    4)   20.00;  2.030
    5)   25.00;  1.790
    6)   30.00;  1.600
    7)   40.00;  1.370
    8)   50.00;  1.200
    9)   60.00;  1.060
   10)   90.00;  0.860
   11)  120.00;  0.730
   12)  180.00;  0.590
   13)  360.00;  0.410
   14) 1200.00;  0.200
  *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

**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1030.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.611
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.407
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.90      0.30      1.000     0    8.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.52
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      2.52

**************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1030.00  DOWNSTREAM(FEET) =    990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.1619
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.52
  FLOW VELOCITY(FEET/SEC) =   5.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.72   Tc(MIN.) =    9.33
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     547.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    9.33
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.201
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.30      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.30     SUBAREA RUNOFF(CFS) =     6.01
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.2       PEAK FLOW RATE(CFS) =       8.36

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.10 IS CODE =  52
--------------------------------------------------------------------------
```

EXISTING CONDITION, DRAINAGE AREA "D"
50-YEAR STORM, EXPECTED VALUE

```
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.1250
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.36
  FLOW VELOCITY(FEET/SEC) =   7.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.71   Tc(MIN.) =   10.04
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.10 =     867.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.10 TO NODE    202.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.04
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.005
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.20      0.30      1.000     -
  USER-DEFINED               -        0.40      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    6.33
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      14.12

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1057.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.171
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.247
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               -        0.70      0.30      1.000     0    9.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.86
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.86

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1057.00  DOWNSTREAM(FEET) =   1026.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE =  0.2441
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.86
  FLOW VELOCITY(FEET/SEC) =   5.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.39   Tc(MIN.) =    9.57
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.10 =     427.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.57
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.134
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.40      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.02
  EFFECTIVE AREA(ACRES) =      1.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =      2.81

****************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.20 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1026.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   389.00   CHANNEL SLOPE =  0.1954
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.81
  FLOW VELOCITY(FEET/SEC) =   5.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.11   Tc(MIN.) =   10.67
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.20 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.20 TO NODE    204.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.67
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.926
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.40      0.30      1.000     -
  USER-DEFINED               -        0.60      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    4.73
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =      7.33

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1118.00  DOWNSTREAM(FEET) =   1062.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.104
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.80      0.30      1.000     0    9.67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.02
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.02

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    206.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1027.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.3182
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.02
 FLOW VELOCITY(FEET/SEC) =   5.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.34   Tc(MIN.) =   10.01
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    206.10 =     410.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    206.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.01
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.009
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50   SUBAREA RUNOFF(CFS) =     1.22
 EFFECTIVE AREA(ACRES) =     1.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      1.3      PEAK FLOW RATE(CFS) =      3.17

****************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    207.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1027.00  DOWNSTREAM(FEET) =    930.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   423.00   CHANNEL SLOPE =  0.2293
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.17
 FLOW VELOCITY(FEET/SEC) =   6.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =   11.18
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =     833.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.18
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.864
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        1.30      0.30      1.000     -
 USER-DEFINED                -        0.60      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.90   SUBAREA RUNOFF(CFS) =     4.38
 EFFECTIVE AREA(ACRES) =     3.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      3.2      PEAK FLOW RATE(CFS) =      7.38

****************************************************************************
 FLOW PROCESS FROM NODE    200.10 TO NODE    200.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1134.00  DOWNSTREAM(FEET) =   1073.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.506
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.151
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.10      0.30      1.000     0    9.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.82
 TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      2.82

****************************************************************************
 FLOW PROCESS FROM NODE    200.20 TO NODE    200.30 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1073.00  DOWNSTREAM(FEET) =    990.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.1137
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.936
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  USER-DEFINED                -        0.70      0.30     1.000      -
  USER-DEFINED                -        1.80      0.30     1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        5.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.19
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   1.09
  Tc(MIN.) =   10.59
  SUBAREA AREA(ACRES) =     2.50       SUBAREA RUNOFF(CFS) =     5.93
  EFFECTIVE AREA(ACRES) =      3.60     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.6          PEAK FLOW RATE(CFS) =       8.54

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =  12.73
  LONGEST FLOWPATH FROM NODE    200.10 TO NODE    200.30 =    1030.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   10.59
  RAINFALL INTENSITY(INCH/HR) =   2.94
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       3.60
  TOTAL STREAM AREA(ACRES) =       3.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.54

****************************************************************************
  FLOW PROCESS FROM NODE    200.31 TO NODE    200.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1238.00  DOWNSTREAM(FEET) =   1204.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.925
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.40      0.30     1.000      0   10.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.95
  TOTAL AREA(ACRES) =       0.40   PEAK FLOW RATE(CFS) =       0.95

****************************************************************************
  FLOW PROCESS FROM NODE    200.32 TO NODE    200.33 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1204.00  DOWNSTREAM(FEET) =   1150.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE =  0.3253
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =        0.95
  FLOW VELOCITY(FEET/SEC) =   3.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =   11.55
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.33 =     466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.33 TO NODE    200.33 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.55
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.818
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.20      0.30     1.000      -
  USER-DEFINED                -        0.30      0.30     1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =     1.13
  EFFECTIVE AREA(ACRES) =      0.90    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       2.04

****************************************************************************
  FLOW PROCESS FROM NODE    200.33 TO NODE    200.34 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =   1100.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   159.00   CHANNEL SLOPE =  0.3145
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =        2.04
  FLOW VELOCITY(FEET/SEC) =   5.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =   12.04
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.34 =     625.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.34 TO NODE    200.34 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.04
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.757
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.80      0.30     1.000      -
  USER-DEFINED                -        0.90      0.30     1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =     3.76
  EFFECTIVE AREA(ACRES) =      2.60    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       5.75
```

EXISTING CONDITION, DRAINAGE AREA "D"
50-YEAR STORM, EXPECTED VALUE

```
****************************************************************************
 FLOW PROCESS FROM NODE     200.34 TO NODE      82.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    1100.00  DOWNSTREAM(FEET) =    1085.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0791
 CHANNEL FLOW THRU SUBAREA(CFS) =       5.75
 FLOW VELOCITY(FEET/SEC) =    6.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =   12.54
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE      82.10 =     812.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      82.10 TO NODE      82.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.54
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.695
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        2.00      0.30      1.000     -
 USER-DEFINED                -        0.40      0.30      1.000     -
 USER-DEFINED                -        1.10      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     3.50      SUBAREA RUNOFF(CFS) =     7.54
 EFFECTIVE AREA(ACRES) =      6.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =      13.15

****************************************************************************
 FLOW PROCESS FROM NODE      82.10 TO NODE     200.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1085.20  DOWNSTREAM(FEET) =    990.00
 FLOW LENGTH(FEET) =   392.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS    6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.54
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.15
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   12.82
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE     200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     200.30 TO NODE     200.30 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.) =   12.82
 RAINFALL INTENSITY(INCH/HR) =   2.66
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.10
 TOTAL STREAM AREA(ACRES) =      6.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.15

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1        8.54   10.59    2.936  0.30( 0.30) 1.00       3.6      200.10
     2       13.15   12.82    2.660  0.30( 0.30) 1.00       6.1      200.31

 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       20.68   10.59    2.936  0.30( 0.30) 1.00       8.6      200.10
     2       20.79   12.82    2.660  0.30( 0.30) 1.00       9.7      200.31

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      20.79    Tc(MIN.) =    12.82
 EFFECTIVE AREA(ACRES) =      9.70   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       9.7
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     200.30 TO NODE     200.40 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     990.00  DOWNSTREAM(FEET) =     970.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1250
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      20.79
 FLOW VELOCITY(FEET/SEC) =    9.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.28   Tc(MIN.) =   13.10
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE     200.40 =    1364.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     200.40 TO NODE     200.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.10
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.626
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.90      0.30      1.000     -
 USER-DEFINED                -        0.20      0.30      1.000     -
 USER-DEFINED                -        0.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     3.35
 EFFECTIVE AREA(ACRES) =     11.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        11.3       PEAK FLOW RATE(CFS) =      23.65

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       23.98   10.87    2.902  0.30( 0.30) 1.00      10.2     200.10
     2       23.65   13.10    2.626  0.30( 0.30) 1.00      11.3     200.31
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      23.98  Tc(MIN.) =   10.87
 AREA-AVERAGED Fm(INCH/HR) =  0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =      10.24

****************************************************************************
 FLOW PROCESS FROM NODE    200.40 TO NODE    200.50 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    970.00  DOWNSTREAM(FEET) =    949.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   156.00   CHANNEL SLOPE =  0.1346
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      23.98
 FLOW VELOCITY(FEET/SEC) =   9.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.26   Tc(MIN.) =   11.13
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.50 =    1520.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.50 TO NODE    200.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.13
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.869
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.60      0.30     1.000     -
 USER-DEFINED               -        0.30      0.30     1.000     -
 USER-DEFINED               -        1.20      0.30     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    2.10      SUBAREA RUNOFF(CFS) =    4.86
 EFFECTIVE AREA(ACRES) =     12.34   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       13.4       PEAK FLOW RATE(CFS) =      28.54
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       13.4  TC(MIN.) =     11.13
 EFFECTIVE AREA(ACRES) =     12.34  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      28.54

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       28.54   11.13    2.869  0.30( 0.30) 1.00      12.3     200.10
     2       27.66   13.36    2.593  0.30( 0.30) 1.00      13.4     200.31
============================================================================
============================================================================
```

END OF RATIONAL METHOD ANALYSIS

```
**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, AREAS "E" & "F", 50-YEAR EXPECTED VALUE            *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 **************************************************************************

  FILE NAME: X-EF-50.DAT
  TIME/DATE OF STUDY: 19:28 01/23/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                      --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   15.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS = 14
   1)    5.00;  4.440
   2)   10.00;  3.010
   3)   15.00;  2.390
   4)   20.00;  2.030
   5)   25.00;  1.790
   6)   30.00;  1.600
   7)   40.00;  1.370
   8)   50.00;  1.200
   9)   60.00;  1.060
  10)   90.00;  0.860
  11)  120.00;  0.730
  12)  180.00;  0.590
  13)  360.00;  0.410
  14) 1200.00;  0.200
  *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   45.0     40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE     400.00 TO NODE     400.10 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1078.00  DOWNSTREAM(FEET) =   1072.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.509
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  4.008
  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                 -        0.50      0.30      0.850     0   10.34
  COMMERCIAL                  -        0.20      0.30      0.100     0    6.51
  COMMERCIAL                  -        0.20      0.30      0.100     0    6.51
  PUBLIC PARK                 -        0.10      0.30      0.850     0   10.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.550
  SUBAREA RUNOFF(CFS) =      3.46
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.46

**************************************************************************
  FLOW PROCESS FROM NODE     400.10 TO NODE     401.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) = 1072.00  DOWNSTREAM ELEVATION(FEET) = 1058.00
  STREET LENGTH(FEET) =   321.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.13
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.83
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.74
  STREET FLOW TRAVEL TIME(MIN.) =   1.11   Tc(MIN.) =    7.62
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.691
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.40      0.30      0.850     -
  USER-DEFINED                -        1.10      0.30      0.850     -
  USER-DEFINED                -        0.30      0.30      0.100     -
```

EXISTING CONDITION, DRAINAGE AREAS "E" & "F"
50-YEAR STORM, EXPECTED VALUE

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
  SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =     5.63
  EFFECTIVE AREA(ACRES) =       2.80    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =         2.8         PEAK FLOW RATE(CFS) =        8.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  12.93
  FLOW VELOCITY(FEET/SEC.) =  5.22   DEPTH*VELOCITY(FT*FT/SEC.) =   2.05
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    401.00 =     621.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1058.00  DOWNSTREAM ELEVATION(FEET) =  990.00
  STREET LENGTH(FEET) =   803.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.55
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.44
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.01
  STREET FLOW TRAVEL TIME(MIN.) =   1.80   Tc(MIN.) =    9.42
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.177
  SUBAREA LOSS RATE DATA(AMC   II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.60      0.30      0.500     -
  USER-DEFINED                -        0.20      0.30      0.500     -
  USER-DEFINED                -        2.20      0.30      0.850     -
  USER-DEFINED                -        0.60      0.30      0.100     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.647
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    9.66
  EFFECTIVE AREA(ACRES) =      6.40    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =        6.4         PEAK FLOW RATE(CFS) =      17.17

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.96
  FLOW VELOCITY(FEET/SEC.) =  7.83   DEPTH*VELOCITY(FT*FT/SEC.) =   3.36
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =    1424.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.42
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.177
  SUBAREA LOSS RATE DATA(AMC   II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.30      0.30      0.850     -
  USER-DEFINED                -        0.20      0.30      1.000     -
  USER-DEFINED                -        0.60      0.30      0.850     -
  USER-DEFINED                -        7.10      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
  SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =   21.27
  EFFECTIVE AREA(ACRES) =     14.60    AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =       14.6         PEAK FLOW RATE(CFS) =      38.44

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    500.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    948.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.815
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA Tc AND LOSS RATE DATA(AMC   II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.30      0.30      1.000     0    9.81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.23
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.23

****************************************************************************
  FLOW PROCESS FROM NODE    500.10 TO NODE    501.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    948.00  DOWNSTREAM(FEET) =    920.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.1000
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.23
  FLOW VELOCITY(FEET/SEC) =   6.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.77   Tc(MIN.) =   10.59
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    501.00 =     580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.59
```

```
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.937
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN
 USER-DEFINED               -        1.10      0.30      1.000     -
 USER-DEFINED               -        0.70      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =     4.27
 EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       7.36
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =         3.1  TC(MIN.) =     10.59
 EFFECTIVE AREA(ACRES) =       3.10  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       7.36
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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                          Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                Irvine,Inc
                        Planning * Engineering * Surveying
                 Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "A", 100-YEAR STORM EXPECTED VALUE    *
* PORTOLA TRACTS 15353 & 17300                                            *
* W.O. #3751-1                                                            *
 **************************************************************************

  FILE NAME: XA-100YR.DAT
  TIME/DATE OF STUDY: 17:22 01/03/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ======  =====  =======
  1   45.0     40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1132.30  DOWNSTREAM(FEET) =   1088.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.148
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.231
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        2.00      0.30      1.000     0   10.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.28
  TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      5.28

**************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1088.30  DOWNSTREAM(FEET) =   1077.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0286
  CHANNEL FLOW THRU SUBAREA(CFS) =      5.28
  FLOW VELOCITY(FEET/SEC) =   3.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.79   Tc(MIN.) =   11.94
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     688.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.94
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.948
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        4.60      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.60      SUBAREA RUNOFF(CFS) =    10.96
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      15.73

**************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1077.20  DOWNSTREAM(FEET) =  1073.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.12
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.73
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.09
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

EXISTING CONDITION, DRAINAGE AREA "A"
100-YEAR STORM, EXPECTED VALUE

```
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.09
  RAINFALL INTENSITY(INCH/HR) =   2.93
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.60
  TOTAL STREAM AREA(ACRES) =       6.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      15.73

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   14.35   RAINFALL INTENSITY(INCH/HR) =  2.66
  EFFECTIVE AREA(ACRES) =    95.67
  TOTAL AREA(ACRES) =   151.43         PEAK FLOW RATE(CFS) =    296.70
  AREA-AVERAGED Fm(INCH/HR) =   0.15  AREA-AVERAGED Fp(INCH/HR) =   0.30
  AREA-AVERAGED Ap =  0.50
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   14.35
  RAINFALL INTENSITY(INCH/HR) =   2.66
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      95.67
  TOTAL STREAM AREA(ACRES) =     151.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     296.70

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       15.73   12.09    2.926  0.30( 0.30) 1.00       6.6     300.00
      2      296.70   14.35    2.656  0.30( 0.15) 0.50      95.7     303.00

  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      292.71   12.09    2.926  0.30( 0.16) 0.54      87.2     300.00
      2      310.81   14.35    2.656  0.30( 0.16) 0.53     102.3     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     310.81    Tc(MIN.) =    14.35
  EFFECTIVE AREA(ACRES) =     102.27   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =      158.0
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.00  DOWNSTREAM(FEET) =  1056.00
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  32.19
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     310.81
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   14.47
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =    1031.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.47
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.644
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.30      0.30      0.100     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.71
  EFFECTIVE AREA(ACRES) =    102.57   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =      158.3       PEAK FLOW RATE(CFS) =     310.81
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1056.00  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  43.05
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     310.81
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   14.48
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    307.00 =    1071.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   14.48
 RAINFALL INTENSITY(INCH/HR) =   2.64
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.53
 EFFECTIVE STREAM AREA(ACRES) =     102.57
 TOTAL STREAM AREA(ACRES) =     158.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     310.81

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1103.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.756
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.513
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.80      0.30      1.000     0    8.76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.31
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.31

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1103.00  DOWNSTREAM(FEET) =   1067.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   644.00   CHANNEL SLOPE =  0.0548
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.247
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        3.40      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.83
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.20
 AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   1.31
 Tc(MIN.) =   10.06
 SUBAREA AREA(ACRES) =     3.40      SUBAREA RUNOFF(CFS) =    9.02
 EFFECTIVE AREA(ACRES) =     4.20    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      4.2        PEAK FLOW RATE(CFS) =     11.14

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   9.82
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =     944.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1067.70  DOWNSTREAM(FEET) =   1052.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0177
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.938
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        4.70      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     16.72
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.62
 AVERAGE FLOW DEPTH(FEET) =   0.57   TRAVEL TIME(MIN.) =   1.94
 Tc(MIN.) =   12.00
 SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =   11.16
 EFFECTIVE AREA(ACRES) =     8.90    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      8.9        PEAK FLOW RATE(CFS) =     21.13

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.65   FLOW VELOCITY(FEET/SEC.) =   8.13
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    311.00 =    1831.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.938
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.70      0.30      1.000     -
 USER-DEFINED                -       11.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.20     SUBAREA RUNOFF(CFS) =   28.97
 EFFECTIVE AREA(ACRES) =    21.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      21.1       PEAK FLOW RATE(CFS) =     50.10

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1051.10  DOWNSTREAM(FEET) =  1050.00
 FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.2 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.48
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      50.10
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   12.22
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   12.22
 RAINFALL INTENSITY(INCH/HR) =   2.91
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      21.10
 TOTAL STREAM AREA(ACRES) =      21.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      50.10

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      292.71   12.23    2.908  0.30( 0.16) 0.54      87.5     300.00
     1      310.81   14.48    2.642  0.30( 0.16) 0.53     102.6     303.00
     2       50.10   12.22    2.909  0.30( 0.30) 1.00      21.1     308.00

 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      342.74   12.22    2.909  0.30( 0.19) 0.63     108.6     308.00
     2      342.79   12.23    2.908  0.30( 0.19) 0.63     108.6     300.00
     3      355.79   14.48    2.642  0.30( 0.18) 0.61     123.7     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     355.79    Tc(MIN.) =    14.48
 EFFECTIVE AREA(ACRES) =     123.67   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.61
 TOTAL AREA(ACRES) =      179.4
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1050.00  DOWNSTREAM(FEET) =  1025.50
 FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  31.61
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     355.79
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   14.70
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.70
 *  25 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
 USER-DEFINED                -        0.80      0.30      0.100     -
 USER-DEFINED                -        2.40      0.30      0.600     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA AREA(ACRES) =     3.20      SUBAREA RUNOFF(CFS) =     7.14
 EFFECTIVE AREA(ACRES) =    126.87   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.61
 TOTAL AREA(ACRES) =      182.6      PEAK FLOW RATE(CFS) =     355.79
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   14.70
 RAINFALL INTENSITY(INCH/HR) =   2.62
 AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.61
 EFFECTIVE STREAM AREA(ACRES) =     126.87
 TOTAL STREAM AREA(ACRES) =     182.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     355.79

****************************************************************************
 FLOW PROCESS FROM NODE    333.10 TO NODE    333.11 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1144.00  DOWNSTREAM(FEET) =   1094.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.892
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.278
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.00      0.30      1.000     0    9.89
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.68
 TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.68
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     333.11 TO NODE     333.20 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    1094.00  DOWNSTREAM(FEET) =    1075.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   275.00   CHANNEL SLOPE =  0.0684
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.68
  FLOW VELOCITY(FEET/SEC) =   4.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =    0.96   Tc(MIN.) =   10.85
  LONGEST FLOWPATH FROM NODE     333.10 TO NODE     333.20 =      575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     333.20 TO NODE     333.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.85
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.112
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -         5.50      0.30      1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =   13.92
  EFFECTIVE AREA(ACRES) =      6.50   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =         6.5       PEAK FLOW RATE(CFS) =      16.45

****************************************************************************
  FLOW PROCESS FROM NODE     333.20 TO NODE     333.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    1075.20  DOWNSTREAM(FEET) =    1032.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   135.00   CHANNEL SLOPE =  0.3200
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.45
  FLOW VELOCITY(FEET/SEC.) =  24.51   FLOW DEPTH(FEET) =    0.82
  TRAVEL TIME(MIN.) =    0.09   Tc(MIN.) =   10.94
  LONGEST FLOWPATH FROM NODE     333.10 TO NODE     333.30 =      710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     333.30 TO NODE     333.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1032.00  DOWNSTREAM ELEVATION(FEET) = 1027.00
  STREET LENGTH(FEET) =   123.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.01
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.48
    HALFSTREET FLOOD WIDTH(FEET) =   17.77
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.98
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.87
  STREET FLOW TRAVEL TIME(MIN.) =    0.34   Tc(MIN.) =   11.28
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.043
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -         0.60      0.30      0.100      -
  USER-DEFINED                -         0.60      0.30      0.850      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     3.13
  EFFECTIVE AREA(ACRES) =      7.70   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =         7.7       PEAK FLOW RATE(CFS) =      19.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.16
  FLOW VELOCITY(FEET/SEC.) =  6.11   DEPTH*VELOCITY(FT*FT/SEC.) =   2.97
  LONGEST FLOWPATH FROM NODE     333.10 TO NODE     333.00 =      833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     333.00 TO NODE     333.00 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.) =   11.28
  RAINFALL INTENSITY(INCH/HR) =   3.04
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.92
  EFFECTIVE STREAM AREA(ACRES) =       7.70
  TOTAL STREAM AREA(ACRES) =       7.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.18

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      342.74   12.43    2.881  0.30( 0.19) 0.62      111.8     308.00
      1      342.79   12.44    2.880  0.30( 0.19) 0.62      111.8     300.00
      1      355.79   14.70    2.620  0.30( 0.18) 0.61      126.9     303.00
      2       19.18   11.28    3.043  0.30( 0.28) 0.92        7.7     333.10

  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      349.01   11.28    3.043  0.30( 0.19) 0.64     109.1     333.10
    2      360.80   12.43    2.881  0.30( 0.19) 0.64     119.5     308.00
    3      360.84   12.44    2.880  0.30( 0.19) 0.64     119.5     300.00
    4      372.04   14.70    2.620  0.30( 0.19) 0.63     134.6     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     372.04    Tc(MIN.) =    14.70
  EFFECTIVE AREA(ACRES) =     134.57   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =      190.3
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1025.50  DOWNSTREAM(FEET) =  1024.00
  FLOW LENGTH(FEET) =   109.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  53.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.93
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     372.04
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   14.80
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   14.80
  RAINFALL INTENSITY(INCH/HR) =   2.61
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.63
  EFFECTIVE STREAM AREA(ACRES) =     134.57
  TOTAL STREAM AREA(ACRES) =     190.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     372.04

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   243.00
  ELEVATION DATA: UPSTREAM(FEET) =   1077.80  DOWNSTREAM(FEET) =   1075.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.680
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.094
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 -        0.20      0.30      0.100     0    6.68
  PUBLIC PARK                -        0.20      0.30      0.850     0   10.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA RUNOFF(CFS) =      1.42
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.42

****************************************************************************
  FLOW PROCESS FROM NODE    335.11 TO NODE    335.10 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1075.00  DOWNSTREAM ELEVATION(FEET) = 1070.00
  STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =    9.80
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.32
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
  STREET FLOW TRAVEL TIME(MIN.) =   1.08   Tc(MIN.) =    7.76
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.762
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.20      0.30      0.100     -
  USER-DEFINED               -        1.10      0.30      0.850     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.735
  SUBAREA AREA(ACRES) =     1.30      SUBAREA RUNOFF(CFS) =     4.14
  EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.67
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =        5.45

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.07
  FLOW VELOCITY(FEET/SEC.) =  3.64   DEPTH*VELOCITY(FT*FT/SEC.) =   1.38
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.10 =     458.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.10 TO NODE    335.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1070.00  DOWNSTREAM ELEVATION(FEET) = 1048.00
  STREET LENGTH(FEET) =   588.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.53
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.40
   HALFSTREET FLOOD WIDTH(FEET) =   13.16
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.90
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.95
 STREET FLOW TRAVEL TIME(MIN.) =   2.00   Tc(MIN.) =    9.76
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.304
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.60      0.30      0.100     -
 USER-DEFINED                -        1.60      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
 SUBAREA AREA(ACRES) =     2.20      SUBAREA RUNOFF(CFS) =     6.16
 EFFECTIVE AREA(ACRES) =      3.90    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =      10.90

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.65
 FLOW VELOCITY(FEET/SEC.) =  5.17   DEPTH*VELOCITY(FT*FT/SEC.) =   2.19
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.20 =    1046.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.20 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1048.00  DOWNSTREAM(FEET) =  1024.00
 FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.45
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.90
 PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   10.42
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    336.00 =    1536.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.42
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.184
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.30      0.30      0.100     -
 USER-DEFINED                -        0.10      0.30      0.850     -
 USER-DEFINED                -        1.50      0.30      0.100     -
 USER-DEFINED                -        1.50      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.453
 SUBAREA AREA(ACRES) =     3.40      SUBAREA RUNOFF(CFS) =     9.33
 EFFECTIVE AREA(ACRES) =      7.30   AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.56
 TOTAL AREA(ACRES) =        7.3        PEAK FLOW RATE(CFS) =      19.81

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   10.42
 RAINFALL INTENSITY(INCH/HR) =   3.18
 AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.56
 EFFECTIVE STREAM AREA(ACRES) =       7.30
 TOTAL STREAM AREA(ACRES) =       7.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.81

 ** CONFLUENCE DATA **
  STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1      349.01   11.39    3.028  0.30( 0.19) 0.64      109.1      333.10
     1      360.80   12.53    2.867  0.30( 0.19) 0.64      119.5      308.00
     1      360.84   12.54    2.866  0.30( 0.19) 0.64      119.5      300.00
     1      372.04   14.80    2.610  0.30( 0.19) 0.63      134.6      303.00
     2       19.81   10.42    3.184  0.30( 0.17) 0.56        7.3      335.00

 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      356.72   10.42    3.184  0.30( 0.19) 0.64      107.1      335.00
     2      367.80   11.39    3.028  0.30( 0.19) 0.64      116.4      333.10
     3      378.53   12.53    2.867  0.30( 0.19) 0.64      126.8      308.00
     4      378.56   12.54    2.866  0.30( 0.19) 0.64      126.8      300.00
     5      388.08   14.80    2.610  0.30( 0.19) 0.62      141.9      303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     388.08    Tc(MIN.) =    14.80
 EFFECTIVE AREA(ACRES) =     141.87   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.62
 TOTAL AREA(ACRES) =      197.6
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1024.00  DOWNSTREAM(FEET) =   895.30
  FLOW LENGTH(FEET) =   549.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  53.81
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     388.08
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   14.97
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   14.97
  RAINFALL INTENSITY(INCH/HR) =   2.59
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.62
  EFFECTIVE STREAM AREA(ACRES) =     141.87
  TOTAL STREAM AREA(ACRES) =     197.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     388.08

****************************************************************************
  FLOW PROCESS FROM NODE    373.00 TO NODE    373.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =   1018.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.657
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.988
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.20      0.30      1.000     0   11.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.90
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      2.90

****************************************************************************
  FLOW PROCESS FROM NODE    373.10 TO NODE    374.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1018.00  DOWNSTREAM(FEET) =    895.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.3098
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.936
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        1.80      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  17.98
  AVERAGE FLOW DEPTH(FEET) =   0.53   TRAVEL TIME(MIN.) =   0.37
  Tc(MIN.) =   12.02
  SUBAREA AREA(ACRES) =     1.80     SUBAREA RUNOFF(CFS) =     4.27
  EFFECTIVE AREA(ACRES) =     3.00    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      3.0        PEAK FLOW RATE(CFS) =      7.12

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.60   FLOW VELOCITY(FEET/SEC.) =  19.78
  LONGEST FLOWPATH FROM NODE    373.00 TO NODE    374.00 =     696.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.02
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.936
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        7.30      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     7.30     SUBAREA RUNOFF(CFS) =    17.32
  EFFECTIVE AREA(ACRES) =    10.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.3      PEAK FLOW RATE(CFS) =      24.43

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   12.02
  RAINFALL INTENSITY(INCH/HR) =   2.94
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     10.30
  TOTAL STREAM AREA(ACRES) =     10.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     24.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)            (ACRES)    NODE
      1      356.72   10.59     3.154  0.30( 0.19) 0.64      107.1     335.00
      1      367.80   11.56     3.002  0.30( 0.19) 0.64      116.4     333.10
      1      378.53   12.71     2.845  0.30( 0.19) 0.64      126.8     308.00
```

EXISTING CONDITION, DRAINAGE AREA "A"
100-YEAR STORM, EXPECTED VALUE

```
     1      378.56   12.72    2.844  0.30( 0.19) 0.64      126.8      300.00
     1      388.08   14.97    2.593  0.30( 0.19) 0.62      141.9      303.00
     2       24.43   12.02    2.936  0.30( 0.30) 1.00       10.3      373.00

  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      380.03   10.59     3.154  0.30( 0.20) 0.67      116.2      335.00
      2      391.87   11.56     3.002  0.30( 0.20) 0.67      126.3      333.10
      3      396.55   12.02     2.936  0.30( 0.20) 0.67      130.9      373.00
      4      402.12   12.71     2.845  0.30( 0.20) 0.66      137.1      308.00
      5      402.15   12.72     2.844  0.30( 0.20) 0.66      137.1      300.00
      6      409.34   14.97     2.593  0.30( 0.19) 0.65      152.2      303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     409.34    Tc(MIN.) =    14.97
  EFFECTIVE AREA(ACRES) =     152.17   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =      207.9
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    377.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   895.30  DOWNSTREAM(FEET) =   890.00
  FLOW LENGTH(FEET) =   170.00  MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  46.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.26
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     409.34
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   15.08
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   15.08
  RAINFALL INTENSITY(INCH/HR) =   2.58
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.65
  EFFECTIVE STREAM AREA(ACRES) =     152.17
  TOTAL STREAM AREA(ACRES) =     207.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     409.34

****************************************************************************
  FLOW PROCESS FROM NODE    375.00 TO NODE    376.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1140.00  DOWNSTREAM(FEET) =   1036.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.544
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.562
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                 -       1.30      0.30      1.000     0    8.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.82
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.82

****************************************************************************
  FLOW PROCESS FROM NODE    376.00 TO NODE    377.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1036.00  DOWNSTREAM(FEET) =    882.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.2034
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.82
  FLOW VELOCITY(FEET/SEC) =   6.27 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.01   Tc(MIN.) =   10.56
  LONGEST FLOWPATH FROM NODE    375.00 TO NODE    377.00 =    1057.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.56
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.160
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                 -       4.70      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.70     SUBAREA RUNOFF(CFS) =   12.10
  EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      6.0       PEAK FLOW RATE(CFS) =      15.44

****************************************************************************
  FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   10.56
  RAINFALL INTENSITY(INCH/HR) =   3.16
  AREA-AVERAGED Fm(INCH/HR) =  0.30
```

EXISTING CONDITION, DRAINAGE AREA "A"
100-YEAR STORM, EXPECTED VALUE

```
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.00
 TOTAL STREAM AREA(ACRES) =       6.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      15.44

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      380.03   10.71    3.135  0.30( 0.20) 0.67      116.2     335.00
     1      391.87   11.67    2.985  0.30( 0.20) 0.67      126.3     333.10
     1      396.55   12.14    2.920  0.30( 0.20) 0.67      130.9     373.00
     1      402.12   12.82    2.831  0.30( 0.20) 0.66      137.1     308.00
     1      402.15   12.83    2.830  0.30( 0.20) 0.66      137.1     300.00
     1      409.34   15.08    2.583  0.30( 0.19) 0.65      152.2     303.00
     2       15.44   10.56    3.160  0.30( 0.30) 1.00        6.0     375.00

 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      393.35   10.56    3.160  0.30( 0.20) 0.68      120.6     375.00
     2      395.33   10.71    3.135  0.30( 0.20) 0.68      122.2     335.00
     3      406.37   11.67    2.985  0.30( 0.20) 0.68      132.3     333.10
     4      410.70   12.14    2.920  0.30( 0.20) 0.68      136.9     373.00
     5      415.78   12.82    2.831  0.30( 0.20) 0.68      143.1     308.00
     6      415.81   12.83    2.830  0.30( 0.20) 0.68      143.1     300.00
     7      421.67   15.08    2.583  0.30( 0.20) 0.66      158.2     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     421.67    Tc(MIN.) =    15.08
 EFFECTIVE AREA(ACRES) =     158.17   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.66
 TOTAL AREA(ACRES) =      213.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    381.00 TO NODE    382.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    992.00  DOWNSTREAM(FEET) =    914.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.448
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"              -        0.20      0.30      1.000     0    9.05
 NATURAL FAIR COVER
 "OPEN BRUSH"              -        1.10      0.30      1.000     0    9.05
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.68
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.68

****************************************************************************
 FLOW PROCESS FROM NODE    383.10 TO NODE    383.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1022.00  DOWNSTREAM(FEET) =   1008.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.730
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.519
 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               -        0.50      0.30      0.850     0    8.73
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA RUNOFF(CFS) =      1.47
 TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.47

****************************************************************************
 FLOW PROCESS FROM NODE    383.20 TO NODE    383.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1008.00  DOWNSTREAM(FEET) =    988.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   347.00   CHANNEL SLOPE =  0.0576
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.401
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -        2.00      0.30      0.850     -
 USER-DEFINED              -        2.40      0.30      0.850     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.70
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.66
 AVERAGE FLOW DEPTH(FEET) =   0.85   TRAVEL TIME(MIN.) =   0.54
 Tc(MIN.) =    9.27
 SUBAREA AREA(ACRES) =     4.40      SUBAREA RUNOFF(CFS) =   12.46
 EFFECTIVE AREA(ACRES) =     4.90    AREA-AVERAGED Fm(INCH/HR) =   0.25
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.85
 TOTAL AREA(ACRES) =      4.9       PEAK FLOW RATE(CFS) =     13.87

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.06   FLOW VELOCITY(FEET/SEC.) =  12.40
 LONGEST FLOWPATH FROM NODE    383.10 TO NODE    383.00 =     647.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    384.10 TO NODE    384.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.138
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.60      0.30     1.000     0   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.53
 TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.53

****************************************************************************
 FLOW PROCESS FROM NODE    385.10 TO NODE    385.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1105.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.896
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.481
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        1.00      0.30     1.000     0    8.90
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.86
 TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.86

****************************************************************************
 FLOW PROCESS FROM NODE    385.20 TO NODE    385.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    980.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   390.00   CHANNEL SLOPE =  0.3205
 CHANNEL FLOW THRU SUBAREA(CFS) =      2.86
 FLOW VELOCITY(FEET/SEC) =   4.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.44   Tc(MIN.) =   10.34
 LONGEST FLOWPATH FROM NODE    385.10 TO NODE    385.00 =     690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    385.00 TO NODE    385.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.34
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.197
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
```

```
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.30      0.30     1.000     -
 USER-DEFINED               -        2.30      0.30     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     6.78
 EFFECTIVE AREA(ACRES) =     3.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      3.6       PEAK FLOW RATE(CFS) =      9.39
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       3.6  TC(MIN.) =     10.34
 EFFECTIVE AREA(ACRES) =      3.60  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      9.39
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "B", 100-YEAR STORM EXPECTED VALUE    *
* PORTOLA TRACTS 15353 & 17300                                            *
* W.O. #3751-1                                                            *
 ************************************************************************

  FILE NAME: XB-100YR.DAT
  TIME/DATE OF STUDY: 18:52 01/03/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
  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) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1207.00  DOWNSTREAM(FEET) =   1142.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.386
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.377
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.80      0.30      1.000     0    9.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.22
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.22

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1142.00  DOWNSTREAM(FEET) =   1136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE =  0.0189
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.22
  FLOW VELOCITY(FEET/SEC) =   2.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.19   Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     618.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.58
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.999
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.80      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.80      SUBAREA RUNOFF(CFS) =     6.80
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.6       PEAK FLOW RATE(CFS) =      8.74

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1136.00  DOWNSTREAM(FEET) =   1124.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0320
  CHANNEL FLOW THRU SUBAREA(CFS) =      8.74
  FLOW VELOCITY(FEET/SEC) =   4.32 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.45   Tc(MIN.) =   13.03
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     993.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   13.03
```

EXISTING CONDITION, DRAINAGE AREA "B"
100-YEAR STORM, EXPECTED VALUE

```
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.805
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        1.50      0.30      1.000     -
 USER-DEFINED                -        3.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.00      SUBAREA RUNOFF(CFS) =   11.28
 EFFECTIVE AREA(ACRES) =      8.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        8.6       PEAK FLOW RATE(CFS) =      19.39

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1124.00  DOWNSTREAM(FEET) =   1120.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0148
 CHANNEL FLOW THRU SUBAREA(CFS) =      19.39
 FLOW VELOCITY(FEET/SEC) =   3.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.06   Tc(MIN.) =   14.09
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1223.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.684
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        4.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.50      SUBAREA RUNOFF(CFS) =    9.65
 EFFECTIVE AREA(ACRES) =     13.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      28.11

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1120.60  DOWNSTREAM(FEET) =  1052.00
 FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.12
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      28.11
 PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   14.50
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1773.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1052.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0718
 CHANNEL FLOW THRU SUBAREA(CFS) =      28.11
 FLOW VELOCITY(FEET/SEC) =   8.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.13   Tc(MIN.) =   15.63
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    2369.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.63
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.531
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.10      0.30      1.000     -
 USER-DEFINED                -        5.40      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =   11.04
 EFFECTIVE AREA(ACRES) =     18.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       18.6       PEAK FLOW RATE(CFS) =      37.34

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   15.63
 RAINFALL INTENSITY(INCH/HR) =   2.53
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      18.60
 TOTAL STREAM AREA(ACRES) =      18.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      37.34

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1242.00  DOWNSTREAM(FEET) =   1216.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.292
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.042
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
```

EXISTING CONDITION, DRAINAGE AREA "B"
100-YEAR STORM, EXPECTED VALUE

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"                -        0.70      0.30      1.000     0   11.29
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      1.73
TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.73

****************************************************************************
FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1216.20  DOWNSTREAM(FEET) =   1188.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   460.00   CHANNEL SLOPE =  0.0613
CHANNEL FLOW THRU SUBAREA(CFS) =       1.73
FLOW VELOCITY(FEET/SEC) =   4.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.85   Tc(MIN.) =   13.15
LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     760.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   13.15
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.791
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        1.60      0.30      1.000     -
USER-DEFINED                -        0.80      0.30      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     2.40      SUBAREA RUNOFF(CFS) =     5.38
EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       6.95

****************************************************************************
FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1188.00  DOWNSTREAM(FEET) =   1107.80
CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.1419
NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       6.95
FLOW VELOCITY(FEET/SEC) =   7.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.30   Tc(MIN.) =   14.45
LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1325.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   14.45
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.646
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        4.80      0.30      1.000     -
USER-DEFINED                -        2.20      0.30      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     7.00      SUBAREA RUNOFF(CFS) =    14.78
EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       10.1       PEAK FLOW RATE(CFS) =      21.32

****************************************************************************
FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1107.80  DOWNSTREAM(FEET) =   1082.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE =  0.0956
CHANNEL FLOW THRU SUBAREA(CFS) =      21.32
FLOW VELOCITY(FEET/SEC) =   9.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =   14.93
LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1595.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   14.93
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.597
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        5.70      0.30      1.000     -
USER-DEFINED                -        0.60      0.30      1.000     -
USER-DEFINED                -        0.30      0.30      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     6.60      SUBAREA RUNOFF(CFS) =    13.65
EFFECTIVE AREA(ACRES) =     16.70   AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       16.7       PEAK FLOW RATE(CFS) =      34.53

****************************************************************************
FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1082.00  DOWNSTREAM(FEET) =  1062.00
FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  17.62
ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      34.53
PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   15.23
```

EXISTING CONDITION, DRAINAGE AREA "B"
100-YEAR STORM, EXPECTED VALUE

```
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   870.00   CHANNEL SLOPE =  0.0607
 CHANNEL FLOW THRU SUBAREA(CFS) =      34.53
 FLOW VELOCITY(FEET/SEC) =   8.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =   16.92
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.92
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.419
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -       10.30      0.30      1.000     -
 USER-DEFINED                -        2.10      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.40      SUBAREA RUNOFF(CFS) =   23.65
 EFFECTIVE AREA(ACRES) =    29.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       29.1      PEAK FLOW RATE(CFS) =      55.50

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   16.92
 RAINFALL INTENSITY(INCH/HR) =   2.42
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      29.10
 TOTAL STREAM AREA(ACRES) =      29.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      55.50

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       37.34   15.63    2.531  0.30( 0.30) 1.00      18.6       1.00
     2       55.50   16.92    2.419  0.30( 0.30) 1.00      29.1       8.00

 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       91.29   15.63    2.531  0.30( 0.30) 1.00      45.5       1.00
     2       90.98   16.92    2.419  0.30( 0.30) 1.00      47.7       8.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      91.29    Tc(MIN.) =    15.63
 EFFECTIVE AREA(ACRES) =      45.47   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       47.7
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1012.00  DOWNSTREAM(FEET) =    954.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.3222
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      91.29
 FLOW VELOCITY(FEET/SEC.) =  32.21   FLOW DEPTH(FEET) =   0.51
 TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =   15.72
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     14.00 =    2969.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     82.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    954.00  DOWNSTREAM(FEET) =    917.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0663
 CHANNEL FLOW THRU SUBAREA(CFS) =      91.29
 FLOW VELOCITY(FEET/SEC) =  11.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.78   Tc(MIN.) =   16.50
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     82.00 =    3527.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     82.00 TO NODE     82.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.50
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.454
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.10      0.30      1.000     -
 USER-DEFINED                -       29.30      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   29.40      SUBAREA RUNOFF(CFS) =   56.99
 EFFECTIVE AREA(ACRES) =    74.87   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       77.1      PEAK FLOW RATE(CFS) =     145.14
============================================================================
```

```
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       77.1  TC(MIN.) =     16.50
  EFFECTIVE AREA(ACRES) =     74.87  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =     145.14

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      145.14   16.50    2.454  0.30( 0.30) 1.00      74.9       1.00
      2      142.33   17.80    2.351  0.30( 0.30) 1.00      77.1       8.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "C", 100-YEAR STORM EXPECTED VALUE    *
* PORTOLLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                            *
 **************************************************************************

  FILE NAME: XC-100YR.DAT
  TIME/DATE OF STUDY: 13:39 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
  FLOW PROCESS FROM NODE     113.00 TO NODE     114.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1128.00  DOWNSTREAM(FEET) =   1050.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.448
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.40      0.30      1.000    83    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.20      0.30      1.000    83    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.70
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.70

**************************************************************************
  FLOW PROCESS FROM NODE     114.00 TO NODE     115.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   295.00   CHANNEL SLOPE =  0.1695
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.70
  FLOW VELOCITY(FEET/SEC) =   5.26 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =    9.98
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    115.00 =     595.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     115.00 TO NODE     115.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    9.98
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.261
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        1.40      0.30      1.000    -
  USER-DEFINED                -        1.60      0.30      1.000    -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.00      SUBAREA RUNOFF(CFS) =     8.00
  EFFECTIVE AREA(ACRES) =     3.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.6       PEAK FLOW RATE(CFS) =      9.59

**************************************************************************
  FLOW PROCESS FROM NODE     115.00 TO NODE     116.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    870.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1055.00   CHANNEL SLOPE =  0.1232
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      9.59
  FLOW VELOCITY(FEET/SEC) =   7.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.25   Tc(MIN.) =   12.23
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    116.00 =    1650.00 FEET.

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

EXISTING CONDITION, DRAINAGE AREA "C"
100-YEAR STORM, EXPECTED VALUE

```
 FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =  81
--------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 MAINLINE Tc(MIN.) =   12.23
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.907
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.40      0.30      1.000     -
 USER-DEFINED                -       13.20      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   13.60      SUBAREA RUNOFF(CFS) =   31.91
 EFFECTIVE AREA(ACRES) =     17.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       17.2       PEAK FLOW RATE(CFS) =      40.36
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       17.2  TC(MIN.) =     12.23
 EFFECTIVE AREA(ACRES) =     17.20  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      40.36
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
                Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "D", 100-YEAR STORM EXPECTED VALUE    *
* PORTOLLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                            *
 **************************************************************************

  FILE NAME: XD-100YR.DAT
  TIME/DATE OF STUDY: 17:25 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  300.00
  ELEVATION DATA: UPSTREAM(FEET) =  1130.00  DOWNSTREAM(FEET) =  1030.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  8.611
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.546
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA     Fp        Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        0.90     0.30      1.000     0    8.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.63
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      2.63

**************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1030.00  DOWNSTREAM(FEET) =    990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.1619
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.63
  FLOW VELOCITY(FEET/SEC) =   5.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.71   Tc(MIN.) =    9.33
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     547.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    9.33
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.390
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA     Fp        Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        2.30     0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    6.40
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.2      PEAK FLOW RATE(CFS) =       8.90

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.10 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.1250
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.90
  FLOW VELOCITY(FEET/SEC) =   7.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.69   Tc(MIN.) =   10.02
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.10 =     867.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    202.10 TO NODE    202.10 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   10.02
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.255
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.20      0.30      1.000     -
  USER-DEFINED               -        0.40      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    6.91
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      15.42

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1057.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.171
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.422
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               -        0.70      0.30      1.000     0    9.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.97
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.97

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1057.00  DOWNSTREAM(FEET) =   1026.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE =  0.2441
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.97
  FLOW VELOCITY(FEET/SEC) =   5.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.39   Tc(MIN.) =    9.56
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.10 =     427.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.56
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.342
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
```

```
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.40      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.10
  EFFECTIVE AREA(ACRES) =      1.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =      3.01

****************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.20 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1026.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   389.00   CHANNEL SLOPE =  0.1954
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.01
  FLOW VELOCITY(FEET/SEC) =   5.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =   10.65
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.20 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.20 TO NODE    204.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.65
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.144
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.40      0.30      1.000     -
  USER-DEFINED               -        0.60      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    5.12
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =      7.93

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1118.00  DOWNSTREAM(FEET) =   1062.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.321
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               -        0.80      0.30      1.000     0    9.67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.18
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.18

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1027.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.3182
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.18
  FLOW VELOCITY(FEET/SEC) =   5.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.33   Tc(MIN.) =   10.00
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    206.10 =     410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.10 TO NODE    206.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.258
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.50      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =     1.33
  EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       1.3       PEAK FLOW RATE(CFS) =       3.46

****************************************************************************
  FLOW PROCESS FROM NODE    206.10 TO NODE    207.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1027.00  DOWNSTREAM(FEET) =    930.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   423.00   CHANNEL SLOPE =  0.2293
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.46
  FLOW VELOCITY(FEET/SEC) =   6.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.15   Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =     833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        1.30      0.30      1.000     -
  USER-DEFINED                -        0.60      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.90      SUBAREA RUNOFF(CFS) =     4.73
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.2       PEAK FLOW RATE(CFS) =       7.96

****************************************************************************
  FLOW PROCESS FROM NODE    200.10 TO NODE    200.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1134.00  DOWNSTREAM(FEET) =   1073.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.506
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.353
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.10      0.30      1.000     0    9.51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.02
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      3.02

****************************************************************************
  FLOW PROCESS FROM NODE    200.20 TO NODE    200.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1073.00  DOWNSTREAM(FEET) =    990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.1137
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.159
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.70      0.30      1.000     -
  USER-DEFINED                -        1.80      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.54
  AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   1.05
  Tc(MIN.) =   10.56
  SUBAREA AREA(ACRES) =     2.50      SUBAREA RUNOFF(CFS) =     6.43
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       3.6       PEAK FLOW RATE(CFS) =       9.26

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =  13.03
```

```
 LONGEST FLOWPATH FROM NODE    200.10 TO NODE    200.30 =    1030.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   10.56
 RAINFALL INTENSITY(INCH/HR) =   3.16
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       3.60
 TOTAL STREAM AREA(ACRES) =       3.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.26

****************************************************************************
 FLOW PROCESS FROM NODE    200.31 TO NODE    200.32 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1238.00  DOWNSTREAM(FEET) =   1204.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.138
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                -        0.40      0.30     1.000     0   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.02
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.02

****************************************************************************
 FLOW PROCESS FROM NODE    200.32 TO NODE    200.33 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1204.00  DOWNSTREAM(FEET) =   1150.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE =  0.3253
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.02
 FLOW VELOCITY(FEET/SEC) =   3.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =   11.55
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.33 =     466.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.33 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.55
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.004
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.20      0.30     1.000     -
 USER-DEFINED                -        0.30      0.30     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50   SUBAREA RUNOFF(CFS) =     1.22
 EFFECTIVE AREA(ACRES) =      0.90   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      0.9      PEAK FLOW RATE(CFS) =      2.19

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.34 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =   1100.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   159.00   CHANNEL SLOPE =  0.3145
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.19
 FLOW VELOCITY(FEET/SEC) =   5.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =   12.02
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.34 =     625.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.34 TO NODE    200.34 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.02
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.936
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.80      0.30     1.000     -
 USER-DEFINED                -        0.90      0.30     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.70   SUBAREA RUNOFF(CFS) =     4.03
 EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      2.6      PEAK FLOW RATE(CFS) =      6.17

****************************************************************************
 FLOW PROCESS FROM NODE    200.34 TO NODE     82.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =   1085.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0791
 CHANNEL FLOW THRU SUBAREA(CFS) =       6.17
 FLOW VELOCITY(FEET/SEC) =   6.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   12.52
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE     82.10 =     812.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     82.10 TO NODE     82.10 IS CODE =  81
```

EXISTING CONDITION, DRAINAGE AREA "D"
100-YEAR STORM, EXPECTED VALUE

```
------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
 MAINLINE Tc(MIN.) =   12.52
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.869
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        2.00      0.30      1.000     -
 USER-DEFINED                -        0.40      0.30      1.000     -
 USER-DEFINED                -        1.10      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     3.50      SUBAREA RUNOFF(CFS) =     8.09
 EFFECTIVE AREA(ACRES) =      6.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =      14.10

******************************************************************************
 FLOW PROCESS FROM NODE      82.10 TO NODE    200.30 IS CODE =  31
------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1085.20  DOWNSTREAM(FEET) =   990.00
 FLOW LENGTH(FEET) =   392.00   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.) =  24.00
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.10
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   12.79
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.30 =    1204.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   12.79
 RAINFALL INTENSITY(INCH/HR) =   2.83
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.10
 TOTAL STREAM AREA(ACRES) =       6.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.10

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR)  (INCH/HR)           (ACRES)    NODE
     1        9.26   10.56     3.159   0.30( 0.30) 1.00       3.6      200.10
     2       14.10   12.79     2.834   0.30( 0.30) 1.00       6.1      200.31

 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       22.40   10.56     3.159   0.30( 0.30) 1.00       8.6      200.10
     2       22.31   12.79     2.834   0.30( 0.30) 1.00       9.7      200.31

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      22.40    Tc(MIN.) =    10.56
 EFFECTIVE AREA(ACRES) =       8.63   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        9.7
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.30 =    1204.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.40 IS CODE =  52
------------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    970.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1250
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      22.40
 FLOW VELOCITY(FEET/SEC) =   9.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.27   Tc(MIN.) =   10.83
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.40 =    1364.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE    200.40 TO NODE    200.40 IS CODE =  81
------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
 MAINLINE Tc(MIN.) =   10.83
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.114
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.90      0.30      1.000     -
 USER-DEFINED                -        0.20      0.30      1.000     -
 USER-DEFINED                -        0.50      0.30      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     4.05
 EFFECTIVE AREA(ACRES) =     10.23   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       11.3       PEAK FLOW RATE(CFS) =      25.92

******************************************************************************
 FLOW PROCESS FROM NODE    200.40 TO NODE    200.50 IS CODE =  52
------------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    970.00  DOWNSTREAM(FEET) =    949.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   156.00   CHANNEL SLOPE =  0.1346
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      25.92
 FLOW VELOCITY(FEET/SEC) =  10.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.26   Tc(MIN.) =   11.09
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.50 =    1520.00 FEET.
```

EXISTING CONDITION, DRAINAGE AREA "D"
100-YEAR STORM, EXPECTED VALUE

```
****************************************************************************
  FLOW PROCESS FROM NODE     200.50 TO NODE     200.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    11.09
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.073
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.60      0.30      1.000     -
  USER-DEFINED                -        0.30      0.30      1.000     -
  USER-DEFINED                -        1.20      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.10      SUBAREA RUNOFF(CFS) =     5.24
  EFFECTIVE AREA(ACRES) =     12.33   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.4       PEAK FLOW RATE(CFS) =      30.79
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       13.4  TC(MIN.) =     11.09
  EFFECTIVE AREA(ACRES) =     12.33  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      30.79

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       30.79   11.09    3.073  0.30( 0.30) 1.00       12.3      200.10
      2       29.79   13.32    2.770  0.30( 0.30) 1.00       13.4      200.31
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine, Inc
                       Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, AREAS "E" & "F", 100-YEAR EXPECTED VALUE           *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: X-EF-100.DAT
  TIME/DATE OF STUDY: 19:18 01/23/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   45.0     40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE     400.00 TO NODE     400.10 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1078.00  DOWNSTREAM(FEET) =   1072.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.509
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.155
  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                 -        0.50      0.30      0.850     0   10.34
  COMMERCIAL                  -        0.20      0.30      0.100     0    6.51
  COMMERCIAL                  -        0.20      0.30      0.100     0    6.51
  PUBLIC PARK                 -        0.10      0.30      0.850     0   10.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.550
  SUBAREA RUNOFF(CFS) =      3.59
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.59

**************************************************************************
  FLOW PROCESS FROM NODE     400.10 TO NODE     401.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) = 1072.00  DOWNSTREAM ELEVATION(FEET) = 1058.00
  STREET LENGTH(FEET) =   321.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.50
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.88
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.78
  STREET FLOW TRAVEL TIME(MIN.) =   1.10   Tc(MIN.) =    7.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.804
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.40      0.30      0.850     -
  USER-DEFINED                -        1.10      0.30      0.850     -
  USER-DEFINED                -        0.30      0.30      0.100     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    5.81
  EFFECTIVE AREA(ACRES) =     2.80    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =       2.8        PEAK FLOW RATE(CFS) =       9.09

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.09
  FLOW VELOCITY(FEET/SEC.) =  5.27   DEPTH*VELOCITY(FT*FT/SEC.) =   2.09
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    401.00 =     621.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     401.00 TO NODE     402.00 IS CODE =  62
--------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1058.00  DOWNSTREAM ELEVATION(FEET) =  990.00
  STREET LENGTH(FEET) =  803.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.25
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =  13.79
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.53
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.08
  STREET FLOW TRAVEL TIME(MIN.) =  1.78   Tc(MIN.) =    9.38
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.378
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.60      0.30      0.500     -
  USER-DEFINED                -        0.20      0.30      0.500     -
  USER-DEFINED                -        2.20      0.30      0.850     -
  USER-DEFINED                -        0.60      0.30      0.100     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.647
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =   10.32
  EFFECTIVE AREA(ACRES) =      6.40    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =        6.4        PEAK FLOW RATE(CFS) =      18.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.35
  FLOW VELOCITY(FEET/SEC.) =  7.97   DEPTH*VELOCITY(FT*FT/SEC.) =   3.48
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =    1424.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.38
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.378
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.30      0.30      0.850     -
  USER-DEFINED                -        0.20      0.30      1.000     -
  USER-DEFINED                -        0.60      0.30      0.850     -
  USER-DEFINED                -        7.10      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
  SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =   22.75
  EFFECTIVE AREA(ACRES) =     14.60   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =       14.6        PEAK FLOW RATE(CFS) =      41.08

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    500.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    948.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.815
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.293
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                -        1.30      0.30      1.000     0    9.81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.50
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.50

****************************************************************************
  FLOW PROCESS FROM NODE    500.10 TO NODE    501.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    948.00  DOWNSTREAM(FEET) =    920.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.1000
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.50
  FLOW VELOCITY(FEET/SEC) =   6.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.76   Tc(MIN.) =   10.57
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    501.00 =     580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.57
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.157
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        1.10      0.30      1.000     -
  USER-DEFINED                -        0.70      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    4.63
  EFFECTIVE AREA(ACRES) =     3.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.1        PEAK FLOW RATE(CFS) =      7.97
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        3.1  TC(MIN.) =     10.57
```

```
  EFFECTIVE AREA(ACRES) =      3.10  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =      7.97
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "A", 2-YEAR STORM HIGH CONFIDENCE    *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XA-2YR.DAT
  TIME/DATE OF STUDY: 08:57 01/04/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)      (FT)  SIDE / SIDE/ WAY     (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   45.0      40.0   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

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1132.30  DOWNSTREAM(FEET) =   1088.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.148
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.508
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        2.00      0.20      1.000    67   10.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.35
  TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      2.35

**************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1088.30  DOWNSTREAM(FEET) =   1077.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0286
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.35
  FLOW VELOCITY(FEET/SEC) =   3.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   12.29
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     688.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   12.29
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.351
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        4.60      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.60      SUBAREA RUNOFF(CFS) =     4.76
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       6.6       PEAK FLOW RATE(CFS) =       6.83

**************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1077.20  DOWNSTREAM(FEET) =  1073.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.95
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.83
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   12.48
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   1
```

EXISTING CONDITION, DRAINAGE AREA "A"
2-YEAR STORM, HIGH CONFIDENCE

```
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.48
 RAINFALL INTENSITY(INCH/HR) =   1.34
 AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.60
 TOTAL STREAM AREA(ACRES) =       6.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.83

**************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   7
--------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN.) =   14.35   RAINFALL INTENSITY(INCH/HR) =  1.24
 EFFECTIVE AREA(ACRES) =    54.48
 TOTAL AREA(ACRES) =   151.43         PEAK FLOW RATE(CFS) =    168.97
 AREA-AVERAGED Fm(INCH/HR) =   0.10  AREA-AVERAGED Fp(INCH/HR) =   0.20
 AREA-AVERAGED Ap =  0.50
 NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
       CONFLUENCE ANALYSES.

**************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   14.35
 RAINFALL INTENSITY(INCH/HR) =   1.24
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =      54.48
 TOTAL STREAM AREA(ACRES) =     151.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     168.97

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        6.83   12.48    1.339  0.20( 0.20) 1.00       6.6     300.00
     2      168.97   14.35    1.236  0.20( 0.10) 0.50      54.5     303.00

 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      167.15   12.48    1.339  0.20( 0.11) 0.56      54.0     300.00
     2      175.19   14.35    1.236  0.20( 0.11) 0.55      61.1     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     175.19    Tc(MIN.) =    14.35
 EFFECTIVE AREA(ACRES) =      61.08   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =      158.0
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1073.00  DOWNSTREAM(FEET) =  1056.00
 FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  26.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  28.66
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     175.19
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   14.48
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =    1031.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   14.48
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.229
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.30      0.20      0.100    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     0.33
 EFFECTIVE AREA(ACRES) =     61.38   AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =      158.3       PEAK FLOW RATE(CFS) =     175.19
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

**************************************************************************
 FLOW PROCESS FROM NODE    304.00 TO NODE    307.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1056.00  DOWNSTREAM(FEET) =  1050.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  37.03
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     175.19
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   14.50
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    307.00 =    1071.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   14.50
  RAINFALL INTENSITY(INCH/HR) =   1.23
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.55
  EFFECTIVE STREAM AREA(ACRES) =      61.38
  TOTAL STREAM AREA(ACRES) =     158.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     175.19

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1103.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.756
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.641
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.80      0.20      1.000     67    8.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.04
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.04

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1103.00  DOWNSTREAM(FEET) =   1067.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   644.00   CHANNEL SLOPE =  0.0548
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.480
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        3.40      0.20      1.000     67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.22
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   1.73
  Tc(MIN.) =   10.48
  SUBAREA AREA(ACRES) =     3.40       SUBAREA RUNOFF(CFS) =     3.92
  EFFECTIVE AREA(ACRES) =     4.20     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      4.2         PEAK FLOW RATE(CFS) =      4.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   7.28
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =     944.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1067.70  DOWNSTREAM(FEET) =   1052.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0177
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.305
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        4.70      0.20      1.000     67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.75
  AVERAGE FLOW DEPTH(FEET) =   0.35   TRAVEL TIME(MIN.) =   2.57
  Tc(MIN.) =   13.05
  SUBAREA AREA(ACRES) =     4.70       SUBAREA RUNOFF(CFS) =     4.67
  EFFECTIVE AREA(ACRES) =     8.90     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      8.9         PEAK FLOW RATE(CFS) =      8.85

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =   6.15
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    311.00 =    1831.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   13.05
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.305
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.70      0.30      1.000     46
  NATURAL FAIR COVER
  "OPEN BRUSH"                D       11.50      0.20      1.000     67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    12.20      SUBAREA RUNOFF(CFS) =    12.07
  EFFECTIVE AREA(ACRES) =     21.10   AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      21.1        PEAK FLOW RATE(CFS) =      20.92

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1051.10  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.67
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.92
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   13.32
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   13.32
  RAINFALL INTENSITY(INCH/HR) =   1.29
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      21.10
  TOTAL STREAM AREA(ACRES) =      21.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      20.92

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1      167.15   12.64    1.329  0.20( 0.11) 0.56       54.3      300.00
      1      175.19   14.50    1.228  0.20( 0.11) 0.55       61.4      303.00
      2       20.92   13.32    1.290  0.20( 0.20) 1.00       21.1      308.00

  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      187.72   12.64    1.329  0.20( 0.14) 0.68       74.3      300.00
      2      191.01   13.32    1.290  0.20( 0.14) 0.68       78.0      308.00
      3      194.93   14.50    1.228  0.20( 0.13) 0.67       82.5      303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     194.93    Tc(MIN.) =    14.50
  EFFECTIVE AREA(ACRES) =      82.48   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
  TOTAL AREA(ACRES) =      179.4
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1050.00  DOWNSTREAM(FEET) =  1025.50
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.43
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     194.93
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   14.74
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.74
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.217
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.80      0.20      0.100    57
  SCHOOL                     D        2.40      0.20      0.600    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     3.20     SUBAREA RUNOFF(CFS) =     3.23
  EFFECTIVE AREA(ACRES) =     85.68   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =      182.6      PEAK FLOW RATE(CFS) =     194.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   14.74
  RAINFALL INTENSITY(INCH/HR) =   1.22
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.66
  EFFECTIVE STREAM AREA(ACRES) =      85.68
  TOTAL STREAM AREA(ACRES) =     182.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     194.93

****************************************************************************
  FLOW PROCESS FROM NODE    333.10 TO NODE    333.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1144.00  DOWNSTREAM(FEET) =   1094.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.892
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.530
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
```

EXISTING CONDITION, DRAINAGE AREA "A"
2-YEAR STORM, HIGH CONFIDENCE

```
"OPEN BRUSH"                D        1.00      0.20     1.000    67    9.89
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =       1.20
TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      1.20

****************************************************************************
FLOW PROCESS FROM NODE    333.11 TO NODE    333.20 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1094.00  DOWNSTREAM(FEET) =   1075.20
CHANNEL LENGTH THRU SUBAREA(FEET) =   275.00   CHANNEL SLOPE =  0.0684
CHANNEL FLOW THRU SUBAREA(CFS) =       1.20
FLOW VELOCITY(FEET/SEC) =   4.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.13   Tc(MIN.) =   11.02
LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.20 =     575.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    333.20 TO NODE    333.20 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   11.02
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.438
SUBAREA LOSS RATE DATA(AMC   I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                D        5.50      0.20     1.000    67
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =     6.13
EFFECTIVE AREA(ACRES) =      6.50   AREA-AVERAGED Fm(INCH/HR) =  0.20
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =        6.5       PEAK FLOW RATE(CFS) =       7.24

****************************************************************************
FLOW PROCESS FROM NODE    333.20 TO NODE    333.30 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1075.20  DOWNSTREAM(FEET) =   1032.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   135.00   CHANNEL SLOPE =  0.3200
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
CHANNEL FLOW THRU SUBAREA(CFS) =       7.24
FLOW VELOCITY(FEET/SEC.) =  20.13   FLOW DEPTH(FEET) =   0.60
TRAVEL TIME(MIN.) =   0.11   Tc(MIN.) =   11.13
LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.30 =     710.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    333.30 TO NODE    333.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) = 1032.00  DOWNSTREAM ELEVATION(FEET) = 1027.00
STREET LENGTH(FEET) =   123.00   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 45.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.018
OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.95
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.39
  HALFSTREET FLOOD WIDTH(FEET) =   12.54
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.97
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.92
STREET FLOW TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   11.55
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.400
SUBAREA LOSS RATE DATA(AMC   I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  D        0.60      0.20     0.100    57
PUBLIC PARK                 D        0.60      0.20     0.850    57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     1.41
EFFECTIVE AREA(ACRES) =      7.70   AREA-AVERAGED Fm(INCH/HR) =  0.18
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.92
TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =       8.43

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  12.93
FLOW VELOCITY(FEET/SEC.) =  5.00   DEPTH*VELOCITY(FT*FT/SEC.) =   1.97
LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.00 =     833.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   11.55
RAINFALL INTENSITY(INCH/HR) =   1.40
AREA-AVERAGED Fm(INCH/HR) =  0.18
AREA-AVERAGED Fp(INCH/HR) =  0.20
AREA-AVERAGED Ap =  0.92
EFFECTIVE STREAM AREA(ACRES) =       7.70
TOTAL STREAM AREA(ACRES) =       7.70
PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.43

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)            (ACRES)    NODE
    1      187.72   12.89    1.314  0.20( 0.13) 0.67      77.5     300.00
    1      191.01   13.57    1.276  0.20( 0.13) 0.67      81.2     308.00
    1      194.93   14.74    1.217  0.20( 0.13) 0.66      85.7     303.00
```

```
    2        8.43   11.55    1.400  0.20( 0.18) 0.92       7.7      333.10

 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       188.79   11.55    1.400  0.20( 0.14) 0.69       77.1      333.10
    2       195.55   12.89    1.314  0.20( 0.14) 0.69       85.2      300.00
    3       198.58   13.57    1.276  0.20( 0.14) 0.69       88.9      308.00
    4       202.09   14.74    1.217  0.20( 0.14) 0.68       93.4      303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     202.09    Tc(MIN.) =    14.74
 EFFECTIVE AREA(ACRES) =      93.38   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.68
 TOTAL AREA(ACRES) =      190.3
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1025.50  DOWNSTREAM(FEET) =  1024.00
 FLOW LENGTH(FEET) =   109.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.62
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     202.09
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   14.86
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   14.86
 RAINFALL INTENSITY(INCH/HR) =   1.21
 AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.68
 EFFECTIVE STREAM AREA(ACRES) =      93.38
 TOTAL STREAM AREA(ACRES) =     190.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     202.09

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    335.11 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   243.00
 ELEVATION DATA: UPSTREAM(FEET) =   1077.80  DOWNSTREAM(FEET) =   1075.00
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.680
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.917
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C        0.20      0.25      0.100    50    6.68
 PUBLIC PARK                 C        0.20      0.25      0.850    50   10.61
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA RUNOFF(CFS) =      0.65
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.65

****************************************************************************
 FLOW PROCESS FROM NODE    335.11 TO NODE    335.10 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1075.00  DOWNSTREAM ELEVATION(FEET) = 1070.00
 STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.58
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    6.29
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.89
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
 STREET FLOW TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =    7.92
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.738
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.20      0.20      0.100    57
 PUBLIC PARK                 D        1.10      0.20      0.850    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.735
 SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    1.86
 EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =       1.7       PEAK FLOW RATE(CFS) =       2.44

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.16
 FLOW VELOCITY(FEET/SEC.) =  3.10   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.10 =     458.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.10 TO NODE    335.20 IS CODE =  62
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1070.00  DOWNSTREAM ELEVATION(FEET) = 1048.00
  STREET LENGTH(FEET) =   588.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =    9.10
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.07
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.32
  STREET FLOW TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =   10.33
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.493
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.60      0.20      0.100    57
  PUBLIC PARK                D        1.60      0.20      0.850    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
  SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    2.70
  EFFECTIVE AREA(ACRES) =      3.90    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =       4.77

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.12
  FLOW VELOCITY(FEET/SEC.) =  4.30   DEPTH*VELOCITY(FT*FT/SEC.) =   1.48
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.20 =    1046.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.20 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1048.00  DOWNSTREAM(FEET) =  1024.00
  FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.96
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.77
  PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    336.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.429
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.30      0.25      0.100    50
  PUBLIC PARK                C        0.10      0.25      0.850    50
  COMMERCIAL                 D        1.50      0.20      0.100    57
  PUBLIC PARK                D        1.50      0.20      0.850    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.453
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    4.09
  EFFECTIVE AREA(ACRES) =      7.30   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =        7.3        PEAK FLOW RATE(CFS) =       8.63

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   11.15
  RAINFALL INTENSITY(INCH/HR) =   1.43
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =       7.30
  TOTAL STREAM AREA(ACRES) =       7.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.63

  ** CONFLUENCE DATA **
   STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      188.79   11.66    1.392  0.20( 0.14) 0.69      77.1      333.10
      1      195.55   13.01    1.308  0.20( 0.14) 0.69      85.2      300.00
      1      198.58   13.69    1.270  0.20( 0.14) 0.69      88.9      308.00
      1      202.09   14.86    1.211  0.20( 0.14) 0.68      93.4      303.00
      2        8.63   11.15    1.429  0.20( 0.11) 0.56       7.3      335.00

  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      194.37   11.15    1.429  0.20( 0.14) 0.68      81.0      335.00
      2      197.18   11.66    1.392  0.20( 0.14) 0.68      84.4      333.10
      3      203.39   13.01    1.308  0.20( 0.14) 0.68      92.5      300.00
      4      206.17   13.69    1.270  0.20( 0.14) 0.68      96.2      308.00
      5      209.29   14.86    1.211  0.20( 0.14) 0.67     100.7      303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     209.29    Tc(MIN.) =    14.86
  EFFECTIVE AREA(ACRES) =     100.68   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
```

```
  TOTAL AREA(ACRES) =      197.6
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1024.00  DOWNSTREAM(FEET) =   895.30
  FLOW LENGTH(FEET) =   549.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  46.00
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     209.29
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   15.06
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   15.06
  RAINFALL INTENSITY(INCH/HR) =   1.20
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.67
  EFFECTIVE STREAM AREA(ACRES) =     100.68
  TOTAL STREAM AREA(ACRES) =     197.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     209.29

****************************************************************************
  FLOW PROCESS FROM NODE    373.00 TO NODE    373.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =   1018.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.657
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.393
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                 D        1.20      0.20      1.000    67   11.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       1.29
  TOTAL AREA(ACRES) =       1.20   PEAK FLOW RATE(CFS) =       1.29

****************************************************************************
  FLOW PROCESS FROM NODE    373.10 TO NODE    374.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1018.00  DOWNSTREAM(FEET) =    895.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.3098
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.362
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                 D        1.80      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.51
  AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   0.45
  Tc(MIN.) =   12.11
  SUBAREA AREA(ACRES) =     1.80     SUBAREA RUNOFF(CFS) =     1.88
  EFFECTIVE AREA(ACRES) =     3.00     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      3.0      PEAK FLOW RATE(CFS) =      3.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =  15.82
  LONGEST FLOWPATH FROM NODE    373.00 TO NODE    374.00 =     696.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.11
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.362
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                 D        7.30      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     7.30     SUBAREA RUNOFF(CFS) =     7.64
  EFFECTIVE AREA(ACRES) =    10.30   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      10.3      PEAK FLOW RATE(CFS) =      10.77

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   12.11
  RAINFALL INTENSITY(INCH/HR) =   1.36
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      10.30
```

```
 TOTAL STREAM AREA(ACRES) =      10.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.77

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      194.37   11.35    1.414  0.20( 0.14) 0.68      81.0     335.00
     1      197.18   11.86    1.379  0.20( 0.14) 0.68      84.4     333.10
     1      203.39   13.21    1.296  0.20( 0.14) 0.68      92.5     300.00
     1      206.17   13.89    1.259  0.20( 0.14) 0.68      96.2     308.00
     1      209.29   15.06    1.202  0.20( 0.14) 0.67     100.7     303.00
     2       10.77   12.11    1.362  0.20( 0.20) 1.00      10.3     373.00

 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      204.92   11.35    1.414  0.20( 0.14) 0.72      90.7     335.00
     2      207.89   11.86    1.379  0.20( 0.14) 0.72      94.5     333.10
     3      209.11   12.11    1.362  0.20( 0.14) 0.72      96.2     373.00
     4      213.55   13.21    1.296  0.20( 0.14) 0.71     102.8     300.00
     5      215.99   13.89    1.259  0.20( 0.14) 0.71     106.5     308.00
     6      218.58   15.06    1.202  0.20( 0.14) 0.70     111.0     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     218.58    Tc(MIN.) =    15.06
 EFFECTIVE AREA(ACRES) =     110.98   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.70
 TOTAL AREA(ACRES) =      207.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    377.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   895.30  DOWNSTREAM(FEET) =   890.00
 FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.69
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     218.58
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   15.19
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   15.19
 RAINFALL INTENSITY(INCH/HR) =   1.20
 AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.70
 EFFECTIVE STREAM AREA(ACRES) =     110.98
 TOTAL STREAM AREA(ACRES) =     207.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     218.58

****************************************************************************
 FLOW PROCESS FROM NODE    375.00 TO NODE    376.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1140.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.544
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.664
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                 D        1.30      0.20      1.000    67    8.54
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.71
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      1.71

****************************************************************************
 FLOW PROCESS FROM NODE    376.00 TO NODE    377.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1036.00  DOWNSTREAM(FEET) =    882.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.2034
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      1.71
 FLOW VELOCITY(FEET/SEC) =   5.27 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =   10.94
 LONGEST FLOWPATH FROM NODE    375.00 TO NODE    377.00 =    1057.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.94
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.444
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                 D        4.70      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =     5.26
 EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      6.0       PEAK FLOW RATE(CFS) =      6.72

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

EXISTING CONDITION, DRAINAGE AREA "A"
2-YEAR STORM, HIGH CONFIDENCE

```
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   10.94
 RAINFALL INTENSITY(INCH/HR) =   1.44
 AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.00
 TOTAL STREAM AREA(ACRES) =       6.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.72

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      204.92   11.48    1.405  0.20( 0.14) 0.72      90.7     335.00
     1      207.89   11.99    1.370  0.20( 0.14) 0.72      94.5     333.10
     1      209.11   12.24    1.354  0.20( 0.14) 0.72      96.2     373.00
     1      213.55   13.34    1.289  0.20( 0.14) 0.71     102.8     300.00
     1      215.99   14.02    1.253  0.20( 0.14) 0.71     106.5     308.00
     1      218.58   15.19    1.196  0.20( 0.14) 0.70     111.0     303.00
     2        6.72   10.94    1.444  0.20( 0.20) 1.00       6.0     375.00

 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      208.06   10.94    1.444  0.20( 0.15) 0.73      92.4     375.00
     2      211.42   11.48    1.405  0.20( 0.15) 0.73      96.7     335.00
     3      214.20   11.99    1.370  0.20( 0.15) 0.73     100.5     333.10
     4      215.34   12.24    1.354  0.20( 0.15) 0.73     102.2     373.00
     5      219.43   13.34    1.289  0.20( 0.15) 0.73     108.8     300.00
     6      221.67   14.02    1.253  0.20( 0.15) 0.73     112.5     308.00
     7      223.96   15.19    1.196  0.20( 0.14) 0.72     117.0     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     223.96    Tc(MIN.) =    15.19
 EFFECTIVE AREA(ACRES) =     116.98   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.72
 TOTAL AREA(ACRES) =      213.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    381.00 TO NODE    382.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    992.00  DOWNSTREAM(FEET) =    914.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.610
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        0.20      0.25      1.000    59    9.05
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        1.10      0.20      1.000    67    9.05
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.64
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      1.64

****************************************************************************
 FLOW PROCESS FROM NODE    383.10 TO NODE    383.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1022.00  DOWNSTREAM(FEET) =   1008.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.730
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.644
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 PUBLIC PARK                D        0.50      0.20      0.850    57    8.73
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA RUNOFF(CFS) =      0.66
 TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      0.66

****************************************************************************
 FLOW PROCESS FROM NODE    383.20 TO NODE    383.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1008.00  DOWNSTREAM(FEET) =    988.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   347.00   CHANNEL SLOPE =  0.0576
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.576
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                C        2.00      0.25      0.850    50
 PUBLIC PARK                D        2.40      0.20      0.850    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.41
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.64
 AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   0.67
 Tc(MIN.) =    9.40
 SUBAREA AREA(ACRES) =     4.40      SUBAREA RUNOFF(CFS) =    5.49
 EFFECTIVE AREA(ACRES) =     4.90     AREA-AVERAGED Fm(INCH/HR) =   0.19
 AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   0.85
 TOTAL AREA(ACRES) =      4.9         PEAK FLOW RATE(CFS) =      6.12
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.78   FLOW VELOCITY(FEET/SEC.) =  10.04
  LONGEST FLOWPATH FROM NODE    383.10 TO NODE    383.00 =     647.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    384.10 TO NODE    384.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =   1036.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.464
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.60      0.25     1.000    59   10.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.66
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      0.66

****************************************************************************
  FLOW PROCESS FROM NODE    385.10 TO NODE    385.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1105.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.896
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.626
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.00      0.20     1.000    67    8.90
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.28
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      1.28

****************************************************************************
  FLOW PROCESS FROM NODE    385.20 TO NODE    385.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    980.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   390.00   CHANNEL SLOPE =  0.3205
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.28
  FLOW VELOCITY(FEET/SEC) =   3.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.89   Tc(MIN.) =   10.78
  LONGEST FLOWPATH FROM NODE    385.10 TO NODE    385.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    385.00 TO NODE    385.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.78
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.456
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.30      0.25     1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        2.30      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     2.93
  EFFECTIVE AREA(ACRES) =     3.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.6       PEAK FLOW RATE(CFS) =      4.06
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       3.6  TC(MIN.) =     10.78
  EFFECTIVE AREA(ACRES) =     3.60  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      4.06
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "A"
2-YEAR STORM, HIGH CONFIDENCE

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

                          HUNSAKER & ASSOCIATES
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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "B", 2-YEAR STORM HIGH CONFIDENCE    *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XB-2YR.DAT
  TIME/DATE OF STUDY: 09:03 01/04/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)      (FT)  SIDE / SIDE/ WAY     (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  ==================  ======  ======  ====  =====  =======
  1   30.0      20.0   0.018/0.018/0.020    0.67    2.00 0.0312 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

**************************************************************************
  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) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1207.00  DOWNSTREAM(FEET) =   1142.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.386
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.577
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                 D        0.80      0.20      1.000    67    9.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.99
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      0.99

**************************************************************************
  FLOW PROCESS FROM NODE       2.00 TO NODE       3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1142.00  DOWNSTREAM(FEET) =   1136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE =  0.0189
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.99
  FLOW VELOCITY(FEET/SEC) =   2.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.57   Tc(MIN.) =   11.96
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     618.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.96
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.372
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                 D        2.80      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.80      SUBAREA RUNOFF(CFS) =     2.95
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.6       PEAK FLOW RATE(CFS) =       3.80

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       4.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1136.00  DOWNSTREAM(FEET) =   1124.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0320
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.80
  FLOW VELOCITY(FEET/SEC) =   3.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.76   Tc(MIN.) =   13.72
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     993.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE       4.00 TO NODE       4.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

EXISTING CONDITION, DRAINAGE AREA "B"
2-YEAR STORM, HIGH CONFIDENCE

```
==========================================================================
  MAINLINE Tc(MIN.) =   13.72
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.268
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.50      0.30      1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        3.50      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.00      SUBAREA RUNOFF(CFS) =    4.67
  EFFECTIVE AREA(ACRES) =      8.60   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.6       PEAK FLOW RATE(CFS) =       8.13

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1124.00  DOWNSTREAM(FEET) =   1120.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0148
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.13
  FLOW VELOCITY(FEET/SEC) =   2.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.33   Tc(MIN.) =   15.05
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1223.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.05
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.203
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        4.50      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.50      SUBAREA RUNOFF(CFS) =    4.06
  EFFECTIVE AREA(ACRES) =     13.10   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      11.68

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1120.60  DOWNSTREAM(FEET) =  1052.00
  FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.90
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.68
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   15.56
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1773.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1052.00  DOWNSTREAM(FEET) =   1009.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0718
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.68
  FLOW VELOCITY(FEET/SEC) =   6.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.43   Tc(MIN.) =   16.99
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    2369.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.99
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.122
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.10      0.25      1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        5.40      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.50      SUBAREA RUNOFF(CFS) =    4.56
  EFFECTIVE AREA(ACRES) =     18.60   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.6       PEAK FLOW RATE(CFS) =      15.29

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   16.99
  RAINFALL INTENSITY(INCH/HR) =   1.12
  AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      18.60
  TOTAL STREAM AREA(ACRES) =      18.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      15.29

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

EXISTING CONDITION, DRAINAGE AREA "B"
2-YEAR STORM, HIGH CONFIDENCE

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1242.00  DOWNSTREAM(FEET) =   1216.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.292
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.418
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.70      0.30      1.000    46   11.29
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.70
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      0.70

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1216.20  DOWNSTREAM(FEET) =   1188.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   460.00   CHANNEL SLOPE =  0.0613
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.70
 FLOW VELOCITY(FEET/SEC) =   3.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.06   Tc(MIN.) =   13.36
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.36
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.288
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.60      0.30      1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.80      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.40      SUBAREA RUNOFF(CFS) =     2.21
 EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       2.83

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1188.00  DOWNSTREAM(FEET) =   1107.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.1419
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.83
 FLOW VELOCITY(FEET/SEC) =   5.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.61   Tc(MIN.) =   14.96
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1325.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.96
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.207
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        4.80      0.30      1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.20      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.00      SUBAREA RUNOFF(CFS) =     5.91
 EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       10.1       PEAK FLOW RATE(CFS) =       8.51

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1107.80  DOWNSTREAM(FEET) =   1082.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE =  0.0956
 CHANNEL FLOW THRU SUBAREA(CFS) =       8.51
 FLOW VELOCITY(FEET/SEC) =   7.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.61   Tc(MIN.) =   15.57
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.57
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.179
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        5.70      0.30      1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.30      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     6.60      SUBAREA RUNOFF(CFS) =     5.28
 EFFECTIVE AREA(ACRES) =     16.70   AREA-AVERAGED Fm(INCH/HR) =  0.28
```

EXISTING CONDITION, DRAINAGE AREA "B"
2-YEAR STORM, HIGH CONFIDENCE

```
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       16.7       PEAK FLOW RATE(CFS) =      13.54

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1082.00  DOWNSTREAM(FEET) =  1062.00
 FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.32
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.54
 PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   15.95
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   870.00   CHANNEL SLOPE =  0.0607
 CHANNEL FLOW THRU SUBAREA(CFS) =      13.54
 FLOW VELOCITY(FEET/SEC) =   6.66 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.18   Tc(MIN.) =   18.12
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.12
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.081
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C       10.30      0.25      1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.10      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.40      SUBAREA RUNOFF(CFS) =    9.37
 EFFECTIVE AREA(ACRES) =     29.10   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       29.1       PEAK FLOW RATE(CFS) =      21.43

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   18.12
 RAINFALL INTENSITY(INCH/HR) =   1.08
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      29.10
 TOTAL STREAM AREA(ACRES) =      29.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.43

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       15.29   16.99    1.122  0.21( 0.21) 1.00       18.6        1.00
     2       21.43   18.12    1.081  0.26( 0.26) 1.00       29.1        8.00

 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       36.38   16.99    1.122  0.24( 0.24) 1.00       45.9        1.00
     2       36.03   18.12    1.081  0.24( 0.24) 1.00       47.7        8.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      36.38    Tc(MIN.) =    16.99
 EFFECTIVE AREA(ACRES) =      45.88   AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      47.7
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1012.00  DOWNSTREAM(FEET) =    954.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.3222
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      36.38
 FLOW VELOCITY(FEET/SEC.) =  23.32   FLOW DEPTH(FEET) =   0.29
 TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =   17.12
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     14.00 =    2969.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     82.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    954.00  DOWNSTREAM(FEET) =    917.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0663
 CHANNEL FLOW THRU SUBAREA(CFS) =      36.38
 FLOW VELOCITY(FEET/SEC) =   9.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =   18.14
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     82.00 =    3527.00 FEET.
```

```
**************************************************************************
 FLOW PROCESS FROM NODE     82.00 TO NODE     82.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 MAINLINE Tc(MIN.) =   18.14
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.080
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                 C        0.10      0.25      1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                 D       29.30      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   29.40      SUBAREA RUNOFF(CFS) =   23.29
 EFFECTIVE AREA(ACRES) =     75.28   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       77.1       PEAK FLOW RATE(CFS) =      57.96
==========================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       77.1  TC(MIN.) =     18.14
 EFFECTIVE AREA(ACRES) =     75.28  AREA-AVERAGED Fm(INCH/HR)=  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      57.96

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       57.96   18.14     1.080  0.22( 0.22) 1.00       75.3        1.00
     2       56.73   19.28     1.043  0.23( 0.23) 1.00       77.1        8.00
==========================================================================
==========================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "C", 2-YEAR STORM HIGH CONFIDENCE    *
* PORTOLLA TRACTS 15353 & 17300                                          *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XC-2YR.DAT
  TIME/DATE OF STUDY: 14:36 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY     (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020    0.67    2.00 0.0312 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

**************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1128.00  DOWNSTREAM(FEET) =   1050.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.610
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    59    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.20      0.20      1.000    67    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.74
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      0.74

**************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   295.00   CHANNEL SLOPE =  0.1695
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.74
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.04   Tc(MIN.) =   10.09
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    115.00 =     595.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   10.09
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.513
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        1.40      0.25      1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.60      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     3.00     SUBAREA RUNOFF(CFS) =     3.48
  EFFECTIVE AREA(ACRES) =     3.60   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.6      PEAK FLOW RATE(CFS) =      4.17

**************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    870.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1055.00   CHANNEL SLOPE =  0.1232
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.17
  FLOW VELOCITY(FEET/SEC) =   6.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.75   Tc(MIN.) =   12.84
```

EXISTING CONDITION, DRAINAGE AREA "C"
2-YEAR STORM, HIGH CONFIDENCE

```
 LONGEST FLOWPATH FROM NODE    113.00 TO NODE    116.00 =    1650.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.84
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.318
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.40      0.25      1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D       13.20      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   13.60      SUBAREA RUNOFF(CFS) =   13.66
 EFFECTIVE AREA(ACRES) =    17.20   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       17.2       PEAK FLOW RATE(CFS) =      17.20
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       17.2  TC(MIN.) =     12.84
 EFFECTIVE AREA(ACRES) =     17.20  AREA-AVERAGED Fm(INCH/HR)=  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      17.20
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "C"
2-YEAR STORM, HIGH CONFIDENCE

```
**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "D", 2-YEAR STORM HIGH CONFIDENCE    *
* PORTOLLA TRACTS 15353 & 17300                                          *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XD-2YR.DAT
  TIME/DATE OF STUDY: 09:46 01/23/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                      --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  300.00
  ELEVATION DATA: UPSTREAM(FEET) =  1130.00  DOWNSTREAM(FEET) =  1030.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.611
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.657
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.90      0.25      1.000    59    8.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.14
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      1.14

**************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1030.00  DOWNSTREAM(FEET) =   990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  247.00  CHANNEL SLOPE =  0.1619
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.14
  FLOW VELOCITY(FEET/SEC) =   4.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.85  Tc(MIN.) =    9.46
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     547.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    9.46
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.570
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        2.30      0.25      1.000    59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.30   SUBAREA RUNOFF(CFS) =    2.73
  EFFECTIVE AREA(ACRES) =     3.20   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.2      PEAK FLOW RATE(CFS) =      3.80

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.10 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   990.00  DOWNSTREAM(FEET) =   950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  320.00  CHANNEL SLOPE =  0.1250
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.80
  FLOW VELOCITY(FEET/SEC) =   6.26 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.85  Tc(MIN.) =   10.31
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.10 =     867.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    202.10 TO NODE    202.10 IS CODE =  81
--------------------------------------------------------------------------
```

EXISTING CONDITION, DRAINAGE AREA "D"
2-YEAR STORM, HIGH CONFIDENCE

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    10.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.494
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        2.20      0.25      1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.40      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     2.93
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       6.51

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1057.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.171
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.598
  SUBAREA Tc AND LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.70      0.25      1.000    59    9.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1057.00  DOWNSTREAM(FEET) =   1026.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE =  0.2441
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.85
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.45   Tc(MIN.) =    9.62
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.10 =     427.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.62
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.555
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     0.47
  EFFECTIVE AREA(ACRES) =      1.10   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =       1.29

****************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.20 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1026.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   389.00   CHANNEL SLOPE =  0.1954
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.29
  FLOW VELOCITY(FEET/SEC) =   4.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.30   Tc(MIN.) =   10.92
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.20 =     816.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.20 TO NODE    204.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.92
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.446
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.40      0.30      1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.60      0.25      1.000    59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.00      SUBAREA RUNOFF(CFS) =     2.09
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       3.27

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1118.00  DOWNSTREAM(FEET) =   1062.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
```

```
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.550
SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"                C        0.80      0.25      1.000    59    9.67
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =       0.94
TOTAL AREA(ACRES) =       0.80   PEAK FLOW RATE(CFS) =       0.94

****************************************************************************
FLOW PROCESS FROM NODE    206.00 TO NODE    206.10 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1027.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.3182
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =        0.94
FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.39   Tc(MIN.) =   10.06
LONGEST FLOWPATH FROM NODE    205.00 TO NODE    206.10 =     410.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    206.10 TO NODE    206.10 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   10.06
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.516
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                C        0.50      0.25      1.000    59
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     0.50     SUBAREA RUNOFF(CFS) =     0.57
EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.25
AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       1.3      PEAK FLOW RATE(CFS) =       1.48

****************************************************************************
FLOW PROCESS FROM NODE    206.10 TO NODE    207.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1027.00  DOWNSTREAM(FEET) =    930.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   423.00   CHANNEL SLOPE =  0.2293
NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =        1.48
FLOW VELOCITY(FEET/SEC) =   5.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.38   Tc(MIN.) =   11.43
LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =     833.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   11.43
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.408
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                B        1.30      0.30      1.000    46
NATURAL FAIR COVER
"OPEN BRUSH"                C        0.60      0.25      1.000    59
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     1.90     SUBAREA RUNOFF(CFS) =     1.92
EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.27
AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       3.2      PEAK FLOW RATE(CFS) =       3.28

****************************************************************************
FLOW PROCESS FROM NODE    200.10 TO NODE    200.20 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
ELEVATION DATA: UPSTREAM(FEET) =   1134.00  DOWNSTREAM(FEET) =   1073.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.506
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.565
SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"                C        1.10      0.25      1.000    59    9.51
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =       1.30
TOTAL AREA(ACRES) =       1.10   PEAK FLOW RATE(CFS) =       1.30

****************************************************************************
FLOW PROCESS FROM NODE    200.20 TO NODE    200.30 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1073.00  DOWNSTREAM(FEET) =    990.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.1137
CHANNEL BASE(FEET) =     2.00   "Z" FACTOR =   1.000
MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.446
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                B        0.70      0.30      1.000    46
NATURAL FAIR COVER
"OPEN BRUSH"                C        1.80      0.25      1.000    59
```

EXISTING CONDITION, DRAINAGE AREA "D"
2-YEAR STORM, HIGH CONFIDENCE

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.65
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   1.41
  Tc(MIN.) =   10.91
  SUBAREA AREA(ACRES) =     2.50       SUBAREA RUNOFF(CFS) =    2.66
  EFFECTIVE AREA(ACRES) =      3.60     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.6         PEAK FLOW RATE(CFS) =       3.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   9.78
  LONGEST FLOWPATH FROM NODE    200.10 TO NODE    200.30 =    1030.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   10.91
  RAINFALL INTENSITY(INCH/HR) =   1.45
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       3.60
  TOTAL STREAM AREA(ACRES) =       3.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.84

****************************************************************************
  FLOW PROCESS FROM NODE    200.31 TO NODE    200.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1238.00  DOWNSTREAM(FEET) =   1204.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.464
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.40      0.20     1.000    67   10.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.45
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.45

****************************************************************************
  FLOW PROCESS FROM NODE    200.32 TO NODE    200.33 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1204.00  DOWNSTREAM(FEET) =   1150.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE =  0.3253
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.45
  FLOW VELOCITY(FEET/SEC) =   3.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =   11.55
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.33 =     466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.33 TO NODE    200.33 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.55
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.400
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.20      0.30     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.30      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =     0.52
  EFFECTIVE AREA(ACRES) =      0.90    AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       0.95

****************************************************************************
  FLOW PROCESS FROM NODE    200.33 TO NODE    200.34 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =   1100.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   159.00   CHANNEL SLOPE =  0.3145
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.95
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.56   Tc(MIN.) =   12.11
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.34 =     625.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.34 TO NODE    200.34 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.11
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.362
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.80      0.30     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.90      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =     1.71
```

EXISTING CONDITION, DRAINAGE AREA "D"
2-YEAR STORM, HIGH CONFIDENCE

```
 EFFECTIVE AREA(ACRES) =      2.60   AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       2.63

****************************************************************************
 FLOW PROCESS FROM NODE    200.34 TO NODE     82.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =   1085.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0791
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.63
 FLOW VELOCITY(FEET/SEC) =   5.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.61   Tc(MIN.) =   12.72
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE     82.10 =     812.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     82.10 TO NODE     82.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.72
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.325
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        2.00      0.30      1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.40      0.25      1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.10      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    3.50      SUBAREA RUNOFF(CFS) =    3.34
 EFFECTIVE AREA(ACRES) =      6.10   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =       5.89

****************************************************************************
 FLOW PROCESS FROM NODE     82.10 TO NODE    200.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1085.20  DOWNSTREAM(FEET) =   990.00
 FLOW LENGTH(FEET) =   392.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.73
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.89
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   13.07
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   13.07
 RAINFALL INTENSITY(INCH/HR) =   1.30
 AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.10
 TOTAL STREAM AREA(ACRES) =       6.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.89

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1        3.84   10.91     1.446  0.26( 0.26) 1.00       3.6     200.10
     2        5.89   13.07     1.304  0.25( 0.25) 1.00       6.1     200.31

 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        9.42   10.91     1.446  0.26( 0.26) 1.00       8.7     200.10
     2        9.27   13.07     1.304  0.26( 0.26) 1.00       9.7     200.31

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       9.42    Tc(MIN.) =    10.91
 EFFECTIVE AREA(ACRES) =      8.69   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       9.7
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.40 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    970.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1250
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       9.42
 FLOW VELOCITY(FEET/SEC) =   7.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.34   Tc(MIN.) =   11.26
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.40 =    1364.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.40 TO NODE    200.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.26
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
```

EXISTING CONDITION, DRAINAGE AREA "D"
2-YEAR STORM, HIGH CONFIDENCE

```
  "OPEN BRUSH"                B        0.90      0.30     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.20      0.25     1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.50      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     1.67
  EFFECTIVE AREA(ACRES) =     10.29   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.3       PEAK FLOW RATE(CFS) =      10.79

****************************************************************************
  FLOW PROCESS FROM NODE    200.40 TO NODE    200.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     970.00  DOWNSTREAM(FEET) =     949.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   156.00   CHANNEL SLOPE =  0.1346
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.79
  FLOW VELOCITY(FEET/SEC) =   8.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.32   Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.50 =    1520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.50 TO NODE    200.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.58
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.398
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.60      0.30     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.30      0.25     1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.20      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.10      SUBAREA RUNOFF(CFS) =     2.20
  EFFECTIVE AREA(ACRES) =     12.39   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.4       PEAK FLOW RATE(CFS) =      12.77
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       13.4  TC(MIN.) =     11.58
  EFFECTIVE AREA(ACRES) =     12.39  AREA-AVERAGED Fm(INCH/HR)=  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      12.77

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       12.77   11.58     1.398  0.25( 0.25) 1.00       12.4      200.10
      2       12.23   13.74     1.267  0.25( 0.25) 1.00       13.4      200.31

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

```
**************************************************************************
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                          Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, AREAS "E" & "F", 2-YEAR STORM HIGH CONFIDENCE      *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 **************************************************************************

  FILE NAME: X-EF-2.DAT
  TIME/DATE OF STUDY: 18:38 01/23/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ======  =====  =======
  1   45.0     40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE     400.00 TO NODE     400.10 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1078.00  DOWNSTREAM(FEET) =   1072.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.509
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.946
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.50      0.30      0.850    36   10.34
  COMMERCIAL                 B        0.20      0.30      0.100    36    6.51
  COMMERCIAL                 C        0.20      0.25      0.100    50    6.51
  PUBLIC PARK                C        0.10      0.25      0.850    50   10.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.550
  SUBAREA RUNOFF(CFS) =      1.61
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      1.61

**************************************************************************
  FLOW PROCESS FROM NODE     400.10 TO NODE     401.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) = 1072.00  DOWNSTREAM ELEVATION(FEET) = 1058.00
  STREET LENGTH(FEET) =   321.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.87
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    7.54
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.22
  STREET FLOW TRAVEL TIME(MIN.) =   1.31   Tc(MIN.) =    7.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.752
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.40      0.30      0.850    36
  PUBLIC PARK                C        1.10      0.25      0.850    50
  COMMERCIAL                 C        0.30      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
  SUBAREA AREA(ACRES) =    1.80     SUBAREA RUNOFF(CFS) =    2.53
  EFFECTIVE AREA(ACRES) =     2.80    AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =       2.8        PEAK FLOW RATE(CFS) =       3.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   8.95
  FLOW VELOCITY(FEET/SEC.) =  4.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.41
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    401.00 =     621.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     401.00 TO NODE     402.00 IS CODE =  62
--------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1058.00  DOWNSTREAM ELEVATION(FEET) =  990.00
  STREET LENGTH(FEET) =   803.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.21
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =    9.49
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.07
  STREET FLOW TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =    9.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.524
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.60      0.30      0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.20      0.25      0.500    50
  PUBLIC PARK                 D        2.20      0.20      0.850    57
  COMMERCIAL                  D        0.60      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.647
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    4.49
  EFFECTIVE AREA(ACRES) =      6.40    AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =        6.4        PEAK FLOW RATE(CFS) =       7.87

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  10.59
  FLOW VELOCITY(FEET/SEC.) =  6.59   DEPTH*VELOCITY(FT*FT/SEC.) =   2.32
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =    1424.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.97
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.524
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        0.30      0.30      0.850    36
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.20      0.30      1.000    46
  PUBLIC PARK                 D        0.60      0.20      0.850    57
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        7.10      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
  SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =    9.75
  EFFECTIVE AREA(ACRES) =     14.60   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      17.62

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    500.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    948.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.815
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.537
  SUBAREA Tc AND LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.30      0.20      1.000    67    9.81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.56
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      1.56

****************************************************************************
  FLOW PROCESS FROM NODE    500.10 TO NODE    501.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    948.00  DOWNSTREAM(FEET) =    920.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.1000
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.56
  FLOW VELOCITY(FEET/SEC) =   5.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.90   Tc(MIN.) =   10.72
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    501.00 =     580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.72
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.461
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.10      0.30      1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.70      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    1.94
```

EXISTING CONDITION, DRAINAGE AREAS "E" & "F"
2-YEAR STORM, HIGH CONFIDENCE

```
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       3.42
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        3.1  TC(MIN.) =     10.72
  EFFECTIVE AREA(ACRES) =      3.10  AREA-AVERAGED Fm(INCH/HR)=  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       3.42
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
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         (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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           Ver. 14.2  Release Date: 08/13/2007  License ID 1239

                        Analysis prepared by:

                        HUNSAKER & ASSOCIATES
                              Irvine,Inc
                    Planning * Engineering * Surveying
            Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "A", 5-YEAR STORM HIGH CONFIDENCE    *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XA-5YR.DAT
  TIME/DATE OF STUDY: 17:47 12/28/2012
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   45.0     40.0    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

************************************************************************
  FLOW PROCESS FROM NODE     300.00 TO NODE     301.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1132.30  DOWNSTREAM(FEET) =   1088.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.148
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.140
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        2.00      0.20      1.000    67   10.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.49
  TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      3.49

************************************************************************
  FLOW PROCESS FROM NODE     301.00 TO NODE     302.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1088.30  DOWNSTREAM(FEET) =   1077.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0286
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.49
  FLOW VELOCITY(FEET/SEC) =   3.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =   12.12
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     688.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     302.00 TO NODE     302.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   12.12
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.937
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        4.60      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.60     SUBAREA RUNOFF(CFS) =     7.19
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       6.6       PEAK FLOW RATE(CFS) =      10.32

************************************************************************
  FLOW PROCESS FROM NODE     302.00 TO NODE     303.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1077.20  DOWNSTREAM(FEET) =  1073.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.07
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.32
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   12.29
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     303.00 TO NODE     303.00 IS CODE =   1
```

EXISTING CONDITION, DRAINAGE AREA "A"
5-YEAR STORM, HIGH CONFIDENCE

```
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.29
  RAINFALL INTENSITY(INCH/HR) =   1.92
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.60
  TOTAL STREAM AREA(ACRES) =       6.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.32

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   14.35   RAINFALL INTENSITY(INCH/HR) =  1.76
  EFFECTIVE AREA(ACRES) =    54.48
  TOTAL AREA(ACRES) =   151.43        PEAK FLOW RATE(CFS) =    207.37
  AREA-AVERAGED Fm(INCH/HR) =   0.10  AREA-AVERAGED Fp(INCH/HR) =   0.20
  AREA-AVERAGED Ap =  0.50
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   14.35
  RAINFALL INTENSITY(INCH/HR) =   1.76
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      54.48
  TOTAL STREAM AREA(ACRES) =     151.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     207.37

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       10.32   12.29    1.922  0.20( 0.20) 1.00       6.6      300.00
      2      207.37   14.35    1.761  0.20( 0.10) 0.50      54.5      303.00

  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      205.03   12.29    1.922  0.20( 0.11) 0.56      53.2      300.00
      2      216.73   14.35    1.761  0.20( 0.11) 0.55      61.1      303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     216.73    Tc(MIN.) =    14.35
  EFFECTIVE AREA(ACRES) =      61.08   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =      158.0
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.00  DOWNSTREAM(FEET) =  1056.00
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  30.19
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     216.73
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   14.48
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =    1031.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.48
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.753
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.30      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     0.47
  EFFECTIVE AREA(ACRES) =     61.38   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =      158.3       PEAK FLOW RATE(CFS) =     216.73
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1056.00  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  39.14
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     216.73
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   14.49
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    307.00 =    1071.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   14.49
  RAINFALL INTENSITY(INCH/HR) =   1.75
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.55
  EFFECTIVE STREAM AREA(ACRES) =      61.38
  TOTAL STREAM AREA(ACRES) =     158.33
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     216.73

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1103.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.756
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.325
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.80      0.20      1.000    67    8.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.53
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.53

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1103.00  DOWNSTREAM(FEET) =   1067.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   644.00   CHANNEL SLOPE =  0.0548
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.124
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        3.40      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.03
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   1.53
  Tc(MIN.) =   10.28
  SUBAREA AREA(ACRES) =     3.40      SUBAREA RUNOFF(CFS) =    5.89
  EFFECTIVE AREA(ACRES) =     4.20    AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       4.2       PEAK FLOW RATE(CFS) =      7.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   8.45
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =     944.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1067.70  DOWNSTREAM(FEET) =   1052.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0177
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.902
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        4.70      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.88
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.62
  AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   2.23
  Tc(MIN.) =   12.51
  SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =    7.20
  EFFECTIVE AREA(ACRES) =     8.90    AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       8.9       PEAK FLOW RATE(CFS) =      13.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   7.13
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    311.00 =    1831.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.51
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.902
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.70      0.30      1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                D       11.50      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.20     SUBAREA RUNOFF(CFS) =   18.63
  EFFECTIVE AREA(ACRES) =    21.10   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       21.1      PEAK FLOW RATE(CFS) =      32.26

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1051.10  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.45
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.26
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   12.76
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   12.76
  RAINFALL INTENSITY(INCH/HR) =   1.88
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      21.10
  TOTAL STREAM AREA(ACRES) =      21.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     32.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      205.03   12.44    1.909  0.20( 0.11) 0.56      53.5     300.00
      1      216.73   14.49    1.751  0.20( 0.11) 0.55      61.4     303.00
      2       32.26   12.76    1.882  0.20( 0.20) 1.00      21.1     308.00

  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      236.99   12.44    1.909  0.20( 0.14) 0.68      74.1     300.00
      2      239.12   12.76    1.882  0.20( 0.14) 0.68      75.9     308.00
      3      246.48   14.49    1.751  0.20( 0.13) 0.67      82.5     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     246.48    Tc(MIN.) =    14.49
  EFFECTIVE AREA(ACRES) =      82.48   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
  TOTAL AREA(ACRES) =     179.4
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1050.00  DOWNSTREAM(FEET) =  1025.50
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.95
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     246.48
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   14.72
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.72
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.736
  SUBAREA LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.80      0.20      0.100    57
  SCHOOL                     D        2.40      0.20      0.600    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     3.20     SUBAREA RUNOFF(CFS) =     4.73
  EFFECTIVE AREA(ACRES) =     85.68   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =      182.6      PEAK FLOW RATE(CFS) =     246.48
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   14.72
  RAINFALL INTENSITY(INCH/HR) =   1.74
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.66
  EFFECTIVE STREAM AREA(ACRES) =      85.68
  TOTAL STREAM AREA(ACRES) =     182.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     246.48

****************************************************************************
  FLOW PROCESS FROM NODE    333.10 TO NODE    333.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1144.00  DOWNSTREAM(FEET) =   1094.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.892
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.171
  SUBAREA Tc AND LOSS RATE DATA(AMC   I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
```

```
"OPEN BRUSH"                D        1.00      0.20      1.000     67     9.89
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =       1.77
TOTAL AREA(ACRES) =       1.00   PEAK FLOW RATE(CFS) =       1.77

****************************************************************************
FLOW PROCESS FROM NODE     333.11 TO NODE     333.20 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    1094.00  DOWNSTREAM(FEET) =    1075.20
CHANNEL LENGTH THRU SUBAREA(FEET) =    275.00   CHANNEL SLOPE =  0.0684
CHANNEL FLOW THRU SUBAREA(CFS) =        1.77
FLOW VELOCITY(FEET/SEC) =    4.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =    1.04   Tc(MIN.) =    10.94
LONGEST FLOWPATH FROM NODE     333.10 TO NODE     333.20 =      575.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     333.20 TO NODE     333.20 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    10.94
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.052
SUBAREA LOSS RATE DATA(AMC   I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                D        5.50      0.20      1.000     67
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =     9.17
EFFECTIVE AREA(ACRES) =      6.50   AREA-AVERAGED Fm(INCH/HR) =  0.20
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =        6.5       PEAK FLOW RATE(CFS) =       10.83

****************************************************************************
FLOW PROCESS FROM NODE     333.20 TO NODE     333.30 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    1075.20  DOWNSTREAM(FEET) =    1032.00
CHANNEL LENGTH THRU SUBAREA(FEET) =    135.00   CHANNEL SLOPE =  0.3200
CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    1.000
MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    2.00
CHANNEL FLOW THRU SUBAREA(CFS) =       10.83
FLOW VELOCITY(FEET/SEC.) =  22.17   FLOW DEPTH(FEET) =    0.70
TRAVEL TIME(MIN.) =    0.10   Tc(MIN.) =    11.04
LONGEST FLOWPATH FROM NODE     333.10 TO NODE     333.30 =      710.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     333.30 TO NODE     333.00 IS CODE =  62
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) = 1032.00  DOWNSTREAM ELEVATION(FEET) = 1027.00
STREET LENGTH(FEET) =    123.00   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 45.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.018
OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       11.86
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.43
  HALFSTREET FLOOD WIDTH(FEET) =   14.96
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.41
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.33
STREET FLOW TRAVEL TIME(MIN.) =    0.38   Tc(MIN.) =    11.42
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.003
SUBAREA LOSS RATE DATA(AMC   I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  D        0.60      0.20      0.100     57
PUBLIC PARK                 D        0.60      0.20      0.850     57
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     2.06
EFFECTIVE AREA(ACRES) =      7.70    AREA-AVERAGED Fm(INCH/HR) =  0.18
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.92
TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =       12.61

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.35
FLOW VELOCITY(FEET/SEC.) =  5.49   DEPTH*VELOCITY(FT*FT/SEC.) =    2.40
LONGEST FLOWPATH FROM NODE     333.10 TO NODE     333.00 =      833.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     333.00 TO NODE     333.00 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.) =    11.42
RAINFALL INTENSITY(INCH/HR) =    2.00
AREA-AVERAGED Fm(INCH/HR) =  0.18
AREA-AVERAGED Fp(INCH/HR) =  0.20
AREA-AVERAGED Ap =  0.92
EFFECTIVE STREAM AREA(ACRES) =       7.70
TOTAL STREAM AREA(ACRES) =       7.70
PEAK FLOW RATE(CFS) AT CONFLUENCE =       12.61

** CONFLUENCE DATA **
 STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
    1      236.99   12.67     1.889  0.20( 0.14) 0.67       77.3      300.00
    1      239.12   12.99     1.863  0.20( 0.14) 0.67       79.1      308.00
    1      246.48   14.72     1.736  0.20( 0.13) 0.66       85.7      303.00
```

```
    2       12.61   11.42    2.003  0.20( 0.18) 0.92       7.7      333.10

 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      240.04   11.42    2.003  0.20( 0.14) 0.70       77.4      333.10
     2      248.81   12.67    1.889  0.20( 0.14) 0.70       85.0      300.00
     3      250.75   12.99    1.863  0.20( 0.14) 0.69       86.8      308.00
     4      257.24   14.72    1.736  0.20( 0.14) 0.68       93.4      303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     257.24    Tc(MIN.) =    14.72
 EFFECTIVE AREA(ACRES) =      93.38   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.68
 TOTAL AREA(ACRES) =      190.3
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1025.50  DOWNSTREAM(FEET) =  1024.00
 FLOW LENGTH(FEET) =   109.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.67
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     257.24
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   14.83
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   14.83
 RAINFALL INTENSITY(INCH/HR) =   1.73
 AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.68
 EFFECTIVE STREAM AREA(ACRES) =      93.38
 TOTAL STREAM AREA(ACRES) =     190.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     257.24

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    335.11 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   243.00
 ELEVATION DATA: UPSTREAM(FEET) =   1077.80  DOWNSTREAM(FEET) =   1075.00
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.680
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.707
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C        0.20      0.25      0.100    50    6.68
 PUBLIC PARK                 C        0.20      0.25      0.850    50   10.61
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA RUNOFF(CFS) =      0.93
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.93

****************************************************************************
 FLOW PROCESS FROM NODE    335.11 TO NODE    335.10 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1075.00  DOWNSTREAM ELEVATION(FEET) = 1070.00
 STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.29
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.30
   HALFSTREET FLOOD WIDTH(FEET) =    7.93
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.04
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.92
 STREET FLOW TRAVEL TIME(MIN.) =   1.18   Tc(MIN.) =    7.86
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.470
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.20      0.20      0.100    57
 PUBLIC PARK                 D        1.10      0.20      0.850    57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.735
 SUBAREA AREA(ACRES) =     1.30      SUBAREA RUNOFF(CFS) =    2.72
 EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       3.56

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =   9.88
 FLOW VELOCITY(FEET/SEC.) =  3.34   DEPTH*VELOCITY(FT*FT/SEC.) =   1.13
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.10 =     458.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.10 TO NODE    335.20 IS CODE =  62
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1070.00  DOWNSTREAM ELEVATION(FEET) = 1048.00
  STREET LENGTH(FEET) =   588.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.57
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   10.90
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.44
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.58
  STREET FLOW TRAVEL TIME(MIN.) =   2.21   Tc(MIN.) =   10.07
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.149
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.60      0.20      0.100    57
  PUBLIC PARK                D        1.60      0.20      0.850    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
  SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    4.00
  EFFECTIVE AREA(ACRES) =      3.90    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =       7.07

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.15
  FLOW VELOCITY(FEET/SEC.) =  4.68   DEPTH*VELOCITY(FT*FT/SEC.) =   1.78
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.20 =    1046.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.20 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1048.00  DOWNSTREAM(FEET) =  1024.00
  FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.11
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.07
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   10.80
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    336.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.80
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.066
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.30      0.25      0.100    50
  PUBLIC PARK                C        0.10      0.25      0.850    50
  COMMERCIAL                 D        1.50      0.20      0.100    57
  PUBLIC PARK                D        1.50      0.20      0.850    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.453
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    6.04
  EFFECTIVE AREA(ACRES) =      7.30   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =        7.3        PEAK FLOW RATE(CFS) =      12.82

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   10.80
  RAINFALL INTENSITY(INCH/HR) =   2.07
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =       7.30
  TOTAL STREAM AREA(ACRES) =      7.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.82

  ** CONFLUENCE DATA **
   STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      240.04   11.53     1.992  0.20( 0.14) 0.70      77.4     333.10
      1      248.81   12.78     1.880  0.20( 0.14) 0.70      85.0     300.00
      1      250.75   13.10     1.854  0.20( 0.14) 0.69      86.8     308.00
      1      257.24   14.83     1.729  0.20( 0.14) 0.68      93.4     303.00
      2       12.82   10.80     2.066  0.20( 0.11) 0.56       7.3     335.00

  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      246.77   10.80     2.066  0.20( 0.14) 0.69      79.8     335.00
      2      252.38   11.53     1.992  0.20( 0.14) 0.69      84.7     333.10
      3      260.40   12.78     1.880  0.20( 0.14) 0.68      92.3     300.00
      4      262.18   13.10     1.854  0.20( 0.14) 0.68      94.1     308.00
      5      267.84   14.83     1.729  0.20( 0.14) 0.67     100.7     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     267.84    Tc(MIN.) =    14.83
  EFFECTIVE AREA(ACRES) =     100.68   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
```

EXISTING CONDITION, DRAINAGE AREA "A"
5-YEAR STORM, HIGH CONFIDENCE

```
  TOTAL AREA(ACRES) =      197.6
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1024.00  DOWNSTREAM(FEET) =   895.30
  FLOW LENGTH(FEET) =   549.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  48.86
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     267.84
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   15.02
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   15.02
  RAINFALL INTENSITY(INCH/HR) =   1.72
  AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.67
  EFFECTIVE STREAM AREA(ACRES) =     100.68
  TOTAL STREAM AREA(ACRES) =     197.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     267.84

****************************************************************************
  FLOW PROCESS FROM NODE    373.00 TO NODE    373.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =   1018.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.657
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.979
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.20      0.20      1.000    67   11.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.92
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      1.92

****************************************************************************
  FLOW PROCESS FROM NODE    373.10 TO NODE    374.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1018.00  DOWNSTREAM(FEET) =    895.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.3098
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.942
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.80      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  16.24
  AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   0.41
  Tc(MIN.) =   12.06
  SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =     2.82
  EFFECTIVE AREA(ACRES) =     3.00     AREA-AVERAGED Fm(INCH/HR) =   0.20
  AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      3.0         PEAK FLOW RATE(CFS) =      4.70

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =  17.67
  LONGEST FLOWPATH FROM NODE    373.00 TO NODE    374.00 =     696.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.06
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.942
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        7.30      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     7.30      SUBAREA RUNOFF(CFS) =    11.44
  EFFECTIVE AREA(ACRES) =    10.30   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      10.3       PEAK FLOW RATE(CFS) =      16.15

****************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   12.06
  RAINFALL INTENSITY(INCH/HR) =   1.94
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      10.30
```

```
 TOTAL STREAM AREA(ACRES) =      10.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.15

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1      246.77   10.99     2.046  0.20( 0.14) 0.69      79.8      335.00
     1      252.38   11.72     1.974  0.20( 0.14) 0.69      84.7      333.10
     1      260.40   12.97     1.865  0.20( 0.14) 0.68      92.3      300.00
     1      262.18   13.29     1.839  0.20( 0.14) 0.68      94.1      308.00
     1      267.84   15.02     1.717  0.20( 0.14) 0.67     100.7      303.00
     2       16.15   12.06     1.942  0.20( 0.20) 1.00      10.3      373.00

 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      262.36   10.99     2.046  0.20( 0.14) 0.72      89.2      335.00
     2      268.35   11.72     1.974  0.20( 0.14) 0.72      94.7      333.10
     3      270.75   12.06     1.942  0.20( 0.14) 0.72      97.1      373.00
     4      275.84   12.97     1.865  0.20( 0.14) 0.72     102.6      300.00
     5      277.38   13.29     1.839  0.20( 0.14) 0.72     104.4      308.00
     6      281.90   15.02     1.717  0.20( 0.14) 0.70     111.0      303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     281.90    Tc(MIN.) =    15.02
 EFFECTIVE AREA(ACRES) =     110.98   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.70
 TOTAL AREA(ACRES) =      207.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    377.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   895.30  DOWNSTREAM(FEET) =   890.00
 FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  41.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.73
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     281.90
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   15.15
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   15.15
 RAINFALL INTENSITY(INCH/HR) =   1.71
 AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.70
 EFFECTIVE STREAM AREA(ACRES) =     110.98
 TOTAL STREAM AREA(ACRES) =     207.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     281.90

****************************************************************************
 FLOW PROCESS FROM NODE    375.00 TO NODE    376.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1140.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.544
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.357
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                 D        1.30      0.20      1.000    67    8.54
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.52
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      2.52

****************************************************************************
 FLOW PROCESS FROM NODE    376.00 TO NODE    377.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1036.00  DOWNSTREAM(FEET) =    882.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.2034
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      2.52
 FLOW VELOCITY(FEET/SEC) =   5.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.21   Tc(MIN.) =   10.75
 LONGEST FLOWPATH FROM NODE    375.00 TO NODE    377.00 =    1057.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.75
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.072
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                 D        4.70      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =     7.92
 EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      6.0       PEAK FLOW RATE(CFS) =      10.11

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

```
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   10.75
 RAINFALL INTENSITY(INCH/HR) =   2.07
 AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.00
 TOTAL STREAM AREA(ACRES) =       6.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.11

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      262.36   11.12    2.033  0.20( 0.14) 0.72      89.2     335.00
     1      268.35   11.84    1.962  0.20( 0.14) 0.72      94.7     333.10
     1      270.75   12.19    1.931  0.20( 0.14) 0.72      97.1     373.00
     1      275.84   13.09    1.855  0.20( 0.14) 0.72     102.6     300.00
     1      277.38   13.41    1.829  0.20( 0.14) 0.72     104.4     308.00
     1      281.90   15.15    1.709  0.20( 0.14) 0.70     111.0     303.00
     2       10.11   10.75    2.072  0.20( 0.20) 1.00       6.0     375.00

 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      269.00   10.75    2.072  0.20( 0.15) 0.74      92.3     375.00
     2      272.26   11.12    2.033  0.20( 0.15) 0.74      95.2     335.00
     3      277.86   11.84    1.962  0.20( 0.15) 0.74     100.7     333.10
     4      280.09   12.19    1.931  0.20( 0.15) 0.74     103.1     373.00
     5      284.77   13.09    1.855  0.20( 0.15) 0.73     108.6     300.00
     6      286.17   13.41    1.829  0.20( 0.15) 0.73     110.4     308.00
     7      290.05   15.15    1.709  0.20( 0.14) 0.72     117.0     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     290.05    Tc(MIN.) =    15.15
 EFFECTIVE AREA(ACRES) =     116.98    AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.72
 TOTAL AREA(ACRES) =      213.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    381.00 TO NODE    382.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    992.00  DOWNSTREAM(FEET) =    914.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.282
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               C        0.20      0.25     1.000     59    9.05
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        1.10      0.20     1.000     67    9.05
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.43
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      2.43

****************************************************************************
 FLOW PROCESS FROM NODE    383.10 TO NODE    383.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1022.00  DOWNSTREAM(FEET) =   1008.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.730
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.329
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 PUBLIC PARK                D        0.50      0.20     0.850     57    8.73
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA RUNOFF(CFS) =      0.97
 TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      0.97

****************************************************************************
 FLOW PROCESS FROM NODE    383.20 TO NODE    383.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1008.00  DOWNSTREAM(FEET) =    988.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   347.00   CHANNEL SLOPE =  0.0576
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.244
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                C        2.00      0.25     0.850     50
 PUBLIC PARK                D        2.40      0.20     0.850     57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.04
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.67
 AVERAGE FLOW DEPTH(FEET) =   0.72   TRAVEL TIME(MIN.) =   0.60
 Tc(MIN.) =    9.33
 SUBAREA AREA(ACRES) =     4.40     SUBAREA RUNOFF(CFS) =    8.14
 EFFECTIVE AREA(ACRES) =     4.90     AREA-AVERAGED Fm(INCH/HR) =   0.19
 AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   0.85
 TOTAL AREA(ACRES) =      4.9      PEAK FLOW RATE(CFS) =      9.07
```

EXISTING CONDITION, DRAINAGE AREA "A"
5-YEAR STORM, HIGH CONFIDENCE

```
 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.90   FLOW VELOCITY(FEET/SEC.) =  11.12
 LONGEST FLOWPATH FROM NODE    383.10 TO NODE    383.00 =     647.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    384.10 TO NODE    384.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  10.685
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.079
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000    59   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.99
 TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      0.99

****************************************************************************
 FLOW PROCESS FROM NODE    385.10 TO NODE    385.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1105.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.896
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.304
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.00      0.20      1.000    67    8.90
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.89
 TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      1.89

****************************************************************************
 FLOW PROCESS FROM NODE    385.20 TO NODE    385.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    980.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   390.00   CHANNEL SLOPE =  0.3205
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.89
 FLOW VELOCITY(FEET/SEC) =   3.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.66   Tc(MIN.) =   10.55
 LONGEST FLOWPATH FROM NODE    385.10 TO NODE    385.00 =     690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    385.00 TO NODE    385.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.55
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.093
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.30      0.25      1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.30      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     4.42
 EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       3.6       PEAK FLOW RATE(CFS) =       6.12
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        3.6  TC(MIN.) =     10.55
 EFFECTIVE AREA(ACRES) =      3.60  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       6.12
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "A"
5-YEAR STORM, HIGH CONFIDENCE

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "B", 5-YEAR STORM HIGH CONFIDENCE    *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XB-5YR.DAT
  TIME/DATE OF STUDY: 09:06 01/04/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
  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) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1207.00  DOWNSTREAM(FEET) =   1142.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.386
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.236
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.80      0.20      1.000    67    9.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.47
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.47

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1142.00  DOWNSTREAM(FEET) =   1136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE =  0.0189
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.47
  FLOW VELOCITY(FEET/SEC) =   2.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =   11.78
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     618.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.78
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.968
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        2.80      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.80     SUBAREA RUNOFF(CFS) =     4.46
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.6       PEAK FLOW RATE(CFS) =       5.73

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1136.00  DOWNSTREAM(FEET) =   1124.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0320
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.73
  FLOW VELOCITY(FEET/SEC) =   3.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   13.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     993.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
```

EXISTING CONDITION, DRAINAGE AREA "B"
5-YEAR STORM, HIGH CONFIDENCE

```
 MAINLINE Tc(MIN.) =   13.38
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.832
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.50      0.30      1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        3.50      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.00      SUBAREA RUNOFF(CFS) =     7.21
 EFFECTIVE AREA(ACRES) =      8.60   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        8.6       PEAK FLOW RATE(CFS) =      12.50

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1124.00  DOWNSTREAM(FEET) =   1120.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0148
 CHANNEL FLOW THRU SUBAREA(CFS) =      12.50
 FLOW VELOCITY(FEET/SEC) =   3.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.19   Tc(MIN.) =   14.57
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1223.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.57
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.746
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.50      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.50      SUBAREA RUNOFF(CFS) =     6.26
 EFFECTIVE AREA(ACRES) =     13.10   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      18.10

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1120.60  DOWNSTREAM(FEET) =  1052.00
 FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.05
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      18.10
 PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   15.03
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1773.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1052.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0718
 CHANNEL FLOW THRU SUBAREA(CFS) =      18.10
 FLOW VELOCITY(FEET/SEC) =   7.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =   16.30
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    2369.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.30
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.640
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.10      0.25      1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        5.40      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =     7.12
 EFFECTIVE AREA(ACRES) =     18.60   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       18.6       PEAK FLOW RATE(CFS) =      23.96

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   16.30
 RAINFALL INTENSITY(INCH/HR) =   1.64
 AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      18.60
 TOTAL STREAM AREA(ACRES) =      18.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      23.96

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1242.00  DOWNSTREAM(FEET) =   1216.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.292
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.015
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.70      0.30      1.000    46   11.29
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =       1.08
 TOTAL AREA(ACRES) =       0.70   PEAK FLOW RATE(CFS) =       1.08

****************************************************************************
 FLOW PROCESS FROM NODE       9.00 TO NODE      10.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1216.20  DOWNSTREAM(FEET) =   1188.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   460.00   CHANNEL SLOPE =  0.0613
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.08
 FLOW VELOCITY(FEET/SEC) =   3.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.03   Tc(MIN.) =   13.33
 LONGEST FLOWPATH FROM NODE       8.00 TO NODE      10.00 =     760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      10.00 TO NODE      10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.33
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.836
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.60      0.30      1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.80      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.40      SUBAREA RUNOFF(CFS) =     3.39
 EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       3.1       PEAK FLOW RATE(CFS) =       4.36

****************************************************************************
 FLOW PROCESS FROM NODE      10.00 TO NODE      11.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1188.00  DOWNSTREAM(FEET) =   1107.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.1419
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       4.36
 FLOW VELOCITY(FEET/SEC) =   6.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.46   Tc(MIN.) =   14.78
 LONGEST FLOWPATH FROM NODE       8.00 TO NODE      11.00 =    1325.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      11.00 TO NODE      11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.78
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.732
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        4.80      0.30      1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.20      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.00      SUBAREA RUNOFF(CFS) =     9.22
 EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       10.1       PEAK FLOW RATE(CFS) =       13.29

****************************************************************************
 FLOW PROCESS FROM NODE      11.00 TO NODE      12.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1107.80  DOWNSTREAM(FEET) =   1082.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE =  0.0956
 CHANNEL FLOW THRU SUBAREA(CFS) =      13.29
 FLOW VELOCITY(FEET/SEC) =   8.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.54   Tc(MIN.) =   15.32
 LONGEST FLOWPATH FROM NODE       8.00 TO NODE      12.00 =    1595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      12.00 TO NODE      12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.32
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.697
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        5.70      0.30      1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.30      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     6.60      SUBAREA RUNOFF(CFS) =     8.35
 EFFECTIVE AREA(ACRES) =     16.70   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       16.7       PEAK FLOW RATE(CFS) =       21.33
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1082.00  DOWNSTREAM(FEET) =  1062.00
 FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.76
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.33
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   15.67
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   870.00   CHANNEL SLOPE =  0.0607
 CHANNEL FLOW THRU SUBAREA(CFS) =      21.33
 FLOW VELOCITY(FEET/SEC) =   7.51 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.93   Tc(MIN.) =   17.60
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.60
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.570
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C       10.30      0.25      1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.10      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.40      SUBAREA RUNOFF(CFS) =   14.83
 EFFECTIVE AREA(ACRES) =     29.10   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      29.1       PEAK FLOW RATE(CFS) =      34.25

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   17.60
 RAINFALL INTENSITY(INCH/HR) =   1.57
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      29.10
 TOTAL STREAM AREA(ACRES) =      29.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      34.25

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       23.96   16.30    1.640  0.21( 0.21) 1.00      18.6       1.00
     2       34.25   17.60    1.570  0.26( 0.26) 1.00      29.1       8.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       57.36   16.30    1.640  0.24( 0.24) 1.00      45.6       1.00
     2       57.05   17.60    1.570  0.24( 0.24) 1.00      47.7       8.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      57.36    Tc(MIN.) =    16.30
 EFFECTIVE AREA(ACRES) =      45.55   AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      47.7
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1012.00  DOWNSTREAM(FEET) =    954.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.3222
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      57.36
 FLOW VELOCITY(FEET/SEC.) =  27.57   FLOW DEPTH(FEET) =   0.39
 TRAVEL TIME(MIN.) =   0.11   Tc(MIN.) =   16.41
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     14.00 =    2969.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     82.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    954.00  DOWNSTREAM(FEET) =    917.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0663
 CHANNEL FLOW THRU SUBAREA(CFS) =      57.36
 FLOW VELOCITY(FEET/SEC) =  10.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.90   Tc(MIN.) =   17.30
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     82.00 =    3527.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     82.00 TO NODE     82.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   17.30
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.585
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        0.10      0.25     1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"               D       29.30      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   29.40      SUBAREA RUNOFF(CFS) =   36.65
  EFFECTIVE AREA(ACRES) =     74.95   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       77.1       PEAK FLOW RATE(CFS) =      91.79
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       77.1  TC(MIN.) =     17.30
  EFFECTIVE AREA(ACRES) =     74.95  AREA-AVERAGED Fm(INCH/HR)=  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      91.79

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1       91.79   17.30    1.585  0.22( 0.22) 1.00      75.0       1.00
      2       89.95   18.61    1.522  0.23( 0.23) 1.00      77.1       8.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
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                        Analysis prepared by:

                        HUNSAKER & ASSOCIATES
                              Irvine,Inc
                     Planning * Engineering * Surveying
            Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "C", 5-YEAR STORM HIGH CONFIDENCE    *
* PORTOLLA TRACTS 15353 & 17300                                          *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XC-5YR.DAT
  TIME/DATE OF STUDY: 14:32 01/22/2013
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ======  ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1128.00  DOWNSTREAM(FEET) =   1050.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.282
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    59    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.20      0.20      1.000    67    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.11
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.11

************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   295.00   CHANNEL SLOPE =  0.1695
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.11
  FLOW VELOCITY(FEET/SEC) =   4.84 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =   10.07
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    115.00 =     595.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   10.07
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.150
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        1.40      0.25      1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.60      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     3.00   SUBAREA RUNOFF(CFS) =     5.20
  EFFECTIVE AREA(ACRES) =     3.60   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.6    PEAK FLOW RATE(CFS) =      6.24

************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    870.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1055.00   CHANNEL SLOPE =  0.1232
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      6.24
  FLOW VELOCITY(FEET/SEC) =   7.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.50   Tc(MIN.) =   12.57
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    116.00 =    1650.00 FEET.
```

EXISTING CONDITION, DRAINAGE AREA "C"
5-YEAR STORM, HIGH CONFIDENCE

```
****************************************************************************
 FLOW PROCESS FROM NODE    116.00 TO NODE    116.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.57
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.898
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.40      0.25      1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D       13.20      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   13.60      SUBAREA RUNOFF(CFS) =   20.76
 EFFECTIVE AREA(ACRES) =     17.20   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       17.2       PEAK FLOW RATE(CFS) =      26.18
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       17.2  TC(MIN.) =     12.57
 EFFECTIVE AREA(ACRES) =     17.20  AREA-AVERAGED Fm(INCH/HR)=  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      26.18
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
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                        Analysis prepared by:

                        HUNSAKER & ASSOCIATES
                              Irvine, Inc
                     Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* EXISTING HYDROLOGY, DRAINAGE AREA "D", 5-YEAR STORM HIGH CONFIDENCE      *
* PORTOLLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                            *
 ************************************************************************

  FILE NAME: XD-5YR.DAT
  TIME/DATE OF STUDY: 09:41 01/23/2013
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ======  ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1030.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.611
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.347
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.90      0.25      1.000    59    8.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.70
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      1.70

************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1030.00  DOWNSTREAM(FEET) =    990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.1619
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.70
  FLOW VELOCITY(FEET/SEC) =   5.26 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.78   Tc(MIN.) =    9.39
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     547.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =    9.39
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.235
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        2.30      0.25      1.000    59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.30   SUBAREA RUNOFF(CFS) =     4.11
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.2    PEAK FLOW RATE(CFS) =      5.72

************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.10 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.1250
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.72
  FLOW VELOCITY(FEET/SEC) =   6.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.77   Tc(MIN.) =   10.17
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.10 =     867.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    202.10 TO NODE    202.10 IS CODE =  81
------------------------------------------------------------------------
```

EXISTING CONDITION, DRAINAGE AREA "D"
5-YEAR STORM, HIGH CONFIDENCE

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.17
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.137
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        2.20      0.25      1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.40      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     4.43
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       9.87

********************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1057.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.171
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.265
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.70      0.25      1.000    59    9.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.27
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.27

********************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1057.00  DOWNSTREAM(FEET) =   1026.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE =  0.2441
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.27
  FLOW VELOCITY(FEET/SEC) =   4.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    9.60
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.10 =     427.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.10 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    9.60
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.208
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     0.70
  EFFECTIVE AREA(ACRES) =      1.10   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =       1.94

********************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.20 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1026.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   389.00   CHANNEL SLOPE =  0.1954
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.94
  FLOW VELOCITY(FEET/SEC) =   5.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.20   Tc(MIN.) =   10.80
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.20 =     816.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    204.20 TO NODE    204.20 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.80
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.067
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.40      0.30      1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.60      0.25      1.000    59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.00      SUBAREA RUNOFF(CFS) =     3.21
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       5.01

********************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1118.00  DOWNSTREAM(FEET) =   1062.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.199
```

```
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.80      0.25      1.000    59    9.67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.40
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.40

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    206.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1027.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.3182
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      1.40
 FLOW VELOCITY(FEET/SEC) =   5.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.36   Tc(MIN.) =   10.03
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    206.10 =     410.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    206.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.03
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.154
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.50      0.25      1.000    59
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50   SUBAREA RUNOFF(CFS) =     0.86
 EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       1.3       PEAK FLOW RATE(CFS) =       2.23

****************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    207.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1027.00  DOWNSTREAM(FEET) =    930.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   423.00   CHANNEL SLOPE =  0.2293
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      2.23
 FLOW VELOCITY(FEET/SEC) =   5.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =   11.30
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =     833.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.30
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.015
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.30      0.30      1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000    59
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.90   SUBAREA RUNOFF(CFS) =     2.96
 EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       3.2       PEAK FLOW RATE(CFS) =       5.02

****************************************************************************
 FLOW PROCESS FROM NODE    200.10 TO NODE    200.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1134.00  DOWNSTREAM(FEET) =   1073.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.506
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.220
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        1.10      0.25      1.000    59    9.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.95
 TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      1.95

****************************************************************************
 FLOW PROCESS FROM NODE    200.20 TO NODE    200.30 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1073.00  DOWNSTREAM(FEET) =    990.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.1137
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.072
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.70      0.30      1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        1.80      0.25      1.000    59
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.81
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   1.24
  Tc(MIN.) =   10.75
  SUBAREA AREA(ACRES) =     2.50       SUBAREA RUNOFF(CFS) =    4.07
  EFFECTIVE AREA(ACRES) =      3.60     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.6         PEAK FLOW RATE(CFS) =       5.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =  11.25
  LONGEST FLOWPATH FROM NODE    200.10 TO NODE    200.30 =    1030.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   10.75
  RAINFALL INTENSITY(INCH/HR) =   2.07
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       3.60
  TOTAL STREAM AREA(ACRES) =       3.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.87

****************************************************************************
  FLOW PROCESS FROM NODE    200.31 TO NODE    200.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1238.00  DOWNSTREAM(FEET) =   1204.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.079
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.40      0.20      1.000    67   10.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.68
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.68

****************************************************************************
  FLOW PROCESS FROM NODE    200.32 TO NODE    200.33 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1204.00  DOWNSTREAM(FEET) =   1150.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE =  0.3253
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.68
  FLOW VELOCITY(FEET/SEC) =   3.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =   11.55
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.33 =     466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.33 TO NODE    200.33 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.55
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.990
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.20      0.30      1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.30      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =     0.79
  EFFECTIVE AREA(ACRES) =      0.90     AREA-AVERAGED Fm(INCH/HR) =   0.22
  AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       1.43

****************************************************************************
  FLOW PROCESS FROM NODE    200.33 TO NODE    200.34 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =   1100.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   159.00   CHANNEL SLOPE =  0.3145
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.43
  FLOW VELOCITY(FEET/SEC) =   5.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =   12.07
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.34 =     625.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.34 TO NODE    200.34 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.07
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.941
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.80      0.30      1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.90      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =     2.59
  EFFECTIVE AREA(ACRES) =      2.60     AREA-AVERAGED Fm(INCH/HR) =   0.24
  AREA-AVERAGED Fp(INCH/HR) =   0.24  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       3.98
```

EXISTING CONDITION, DRAINAGE AREA "D"
5-YEAR STORM, HIGH CONFIDENCE

```
****************************************************************************
 FLOW PROCESS FROM NODE     200.34 TO NODE      82.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =   1085.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0791
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.98
 FLOW VELOCITY(FEET/SEC) =   5.63 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.55   Tc(MIN.) =   12.63
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE     82.10 =     812.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      82.10 TO NODE      82.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.63
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.893
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        2.00      0.30      1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.40      0.25      1.000    59
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.10      0.20      1.000    67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     3.50      SUBAREA RUNOFF(CFS) =     5.13
 EFFECTIVE AREA(ACRES) =      6.10   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =       9.00

****************************************************************************
 FLOW PROCESS FROM NODE      82.10 TO NODE     200.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1085.20  DOWNSTREAM(FEET) =   990.00
 FLOW LENGTH(FEET) =   392.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.16
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.00
 PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   12.93
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   12.93
 RAINFALL INTENSITY(INCH/HR) =   1.87
 AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.10
 TOTAL STREAM AREA(ACRES) =       6.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.00

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1        5.87   10.75    2.072  0.26( 0.26) 1.00        3.6     200.10
     2        9.00   12.93    1.867  0.25( 0.25) 1.00        6.1     200.31

 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       14.30   10.75    2.072  0.26( 0.26) 1.00        8.7     200.10
     2       14.21   12.93    1.867  0.26( 0.26) 1.00        9.7     200.31

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      14.30    Tc(MIN.) =    10.75
 EFFECTIVE AREA(ACRES) =       8.67   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        9.7
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.40 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    970.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1250
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      14.30
 FLOW VELOCITY(FEET/SEC) =   8.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.31   Tc(MIN.) =   11.05
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.40 =    1364.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.40 TO NODE    200.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.05
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.039
 SUBAREA LOSS RATE DATA(AMC   I ):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.90      0.30      1.000    46
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.20      0.25      1.000    59
```

```
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.50      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    2.56
  EFFECTIVE AREA(ACRES) =     10.27   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.3       PEAK FLOW RATE(CFS) =      16.48

****************************************************************************
  FLOW PROCESS FROM NODE    200.40 TO NODE    200.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    970.00  DOWNSTREAM(FEET) =    949.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   156.00   CHANNEL SLOPE =  0.1346
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.48
  FLOW VELOCITY(FEET/SEC) =   9.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.29   Tc(MIN.) =   11.34
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.50 =    1520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.50 TO NODE    200.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.34
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.010
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.60      0.30     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.30      0.25     1.000    59
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.20      0.20     1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.10      SUBAREA RUNOFF(CFS) =    3.35
  EFFECTIVE AREA(ACRES) =     12.37   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.4       PEAK FLOW RATE(CFS) =      19.56
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       13.4  TC(MIN.) =     11.34
  EFFECTIVE AREA(ACRES) =     12.37  AREA-AVERAGED Fm(INCH/HR)=  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      19.56

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       19.56   11.34    2.010  0.25( 0.25) 1.00       12.4      200.10
      2       18.90   13.53    1.820  0.25( 0.25) 1.00       13.4      200.31
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
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                          Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* EXISTING HYDROLOGY, AREAS "E" & "F", 5-YEAR STORM HIGH CONFIDENCE      *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: X-EF-5.DAT
  TIME/DATE OF STUDY: 18:32 01/23/2013
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    5.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   45.0     40.0    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

************************************************************************
  FLOW PROCESS FROM NODE     400.00 TO NODE     400.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1078.00  DOWNSTREAM(FEET) =   1072.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.509
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.746
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                 B        0.50      0.30      0.850    36   10.34
  COMMERCIAL                  B        0.20      0.30      0.100    36    6.51
  COMMERCIAL                  C        0.20      0.25      0.100    50    6.51
  PUBLIC PARK                 C        0.10      0.25      0.850    50   10.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.550
  SUBAREA RUNOFF(CFS) =      2.33
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.33

************************************************************************
  FLOW PROCESS FROM NODE     400.10 TO NODE     401.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1072.00  DOWNSTREAM ELEVATION(FEET) = 1058.00
  STREET LENGTH(FEET) =   321.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.20
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =    9.18
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.44
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.45
  STREET FLOW TRAVEL TIME(MIN.) =   1.21   Tc(MIN.) =    7.72
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.496
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        0.40      0.30      0.850    36
  PUBLIC PARK                 C        1.10      0.25      0.850    50
  COMMERCIAL                  C        0.30      0.25      0.100    50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    3.74
  EFFECTIVE AREA(ACRES) =      2.80    AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       5.84

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  10.74
  FLOW VELOCITY(FEET/SEC.) =  4.77   DEPTH*VELOCITY(FT*FT/SEC.) =   1.69
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    401.00 =     621.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     401.00 TO NODE     402.00 IS CODE =  62
------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1058.00  DOWNSTREAM ELEVATION(FEET) =  990.00
  STREET LENGTH(FEET) =   803.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   11.37
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.81
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.49
  STREET FLOW TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =    9.68
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.197
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.60      0.30      0.500    36
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.20      0.25      0.500    50
  PUBLIC PARK                 D        2.20      0.20      0.850    57
  COMMERCIAL                  D        0.60      0.20      0.100    57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.647
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    6.67
  EFFECTIVE AREA(ACRES) =      6.40    AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =        6.4        PEAK FLOW RATE(CFS) =      11.75

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  12.70
  FLOW VELOCITY(FEET/SEC.) =  7.20   DEPTH*VELOCITY(FT*FT/SEC.) =   2.80
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =    1424.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.68
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.197
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        0.30      0.30      0.850    36
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.20      0.30      1.000    46
  PUBLIC PARK                 D        0.60      0.20      0.850    57
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        7.10      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
  SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =   14.72
  EFFECTIVE AREA(ACRES) =     14.60   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      26.48

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    500.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    948.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.815
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.180
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.30      0.20      1.000    67    9.81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.32
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      2.32

****************************************************************************
  FLOW PROCESS FROM NODE    500.10 TO NODE    501.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    948.00  DOWNSTREAM(FEET) =    920.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.1000
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.32
  FLOW VELOCITY(FEET/SEC) =   5.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.83   Tc(MIN.) =   10.65
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    501.00 =     580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.65
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.083
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.10      0.30      1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.70      0.20      1.000    67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    2.95
```

```
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       5.15
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        3.1  TC(MIN.) =     10.65
  EFFECTIVE AREA(ACRES) =      3.10  AREA-AVERAGED Fm(INCH/HR)=  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       5.15
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 14.2  Release Date: 08/13/2007  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "A", 10-YEAR STORM HIGH CONFIDENCE     *
* PORTOLA TRACTS 15353 & 17300                                            *
* W.O. #3751-1                                                            *
 **************************************************************************

  FILE NAME: XA-10YR.DAT
  TIME/DATE OF STUDY: 17:38 12/28/2012
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====  =====  =======
  1   45.0     40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE     300.00 TO NODE     301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1132.30  DOWNSTREAM(FEET) =   1088.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.148
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.706
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        2.00      0.20      1.000    83   10.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.51
  TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      4.51

**************************************************************************
  FLOW PROCESS FROM NODE     301.00 TO NODE     302.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1088.30  DOWNSTREAM(FEET) =   1077.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0286
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.51
  FLOW VELOCITY(FEET/SEC) =   3.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.86   Tc(MIN.) =   12.00
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     688.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     302.00 TO NODE     302.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   12.00
  *  10 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
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        4.60      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.60      SUBAREA RUNOFF(CFS) =     9.35
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       6.6       PEAK FLOW RATE(CFS) =      13.41

**************************************************************************
  FLOW PROCESS FROM NODE     302.00 TO NODE     303.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1077.20  DOWNSTREAM(FEET) =  1073.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.76
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.41
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.16
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     303.00 TO NODE     303.00 IS CODE =   1
--------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.16
  RAINFALL INTENSITY(INCH/HR) =   2.44
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.60
  TOTAL STREAM AREA(ACRES) =       6.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.41

**************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   14.35   RAINFALL INTENSITY(INCH/HR) =  2.22
  EFFECTIVE AREA(ACRES) =    77.94
  TOTAL AREA(ACRES) =   151.43         PEAK FLOW RATE(CFS) =    241.73
  AREA-AVERAGED Fm(INCH/HR) =   0.10  AREA-AVERAGED Fp(INCH/HR) =   0.20
  AREA-AVERAGED Ap =  0.50
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

**************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   14.35
  RAINFALL INTENSITY(INCH/HR) =   2.22
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      77.94
  TOTAL STREAM AREA(ACRES) =     151.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     241.73

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       13.41   12.16    2.439  0.20( 0.20) 1.00       6.6     300.00
      2      241.73   14.35    2.219  0.20( 0.10) 0.50      77.9     303.00

  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      239.64   12.16    2.439  0.20( 0.11) 0.55      72.7     300.00
      2      253.82   14.35    2.219  0.20( 0.11) 0.54      84.5     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     253.82    Tc(MIN.) =    14.35
  EFFECTIVE AREA(ACRES) =      84.54   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =      158.0
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.00  DOWNSTREAM(FEET) =  1056.00
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  30.74
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     253.82
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   14.47
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =    1031.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   14.47
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.208
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.30      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     0.59
  EFFECTIVE AREA(ACRES) =     84.84   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =      158.3       PEAK FLOW RATE(CFS) =     253.82
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

**************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    307.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1056.00  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  40.95
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     253.82
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   14.49
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    307.00 =    1071.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   14.49
 RAINFALL INTENSITY(INCH/HR) =   2.21
 AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.54
 EFFECTIVE STREAM AREA(ACRES) =      84.84
 TOTAL STREAM AREA(ACRES) =     158.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     253.82

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1103.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.756
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.945
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.80      0.20      1.000    83    8.76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.98
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.98

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1103.00  DOWNSTREAM(FEET) =   1067.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   644.00   CHANNEL SLOPE =  0.0548
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.708
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        3.40      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.82
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.78
 AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   1.38
 Tc(MIN.) =   10.14
 SUBAREA AREA(ACRES) =     3.40      SUBAREA RUNOFF(CFS) =    7.67
 EFFECTIVE AREA(ACRES) =     4.20    AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      4.2        PEAK FLOW RATE(CFS) =      9.48

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   9.35
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =     944.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1067.70  DOWNSTREAM(FEET) =   1052.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0177
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.437
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.70      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     14.22
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.21
 AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   2.05
 Tc(MIN.) =   12.19
 SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =    9.46
 EFFECTIVE AREA(ACRES) =     8.90    AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      8.9        PEAK FLOW RATE(CFS) =     17.91

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.59   FLOW VELOCITY(FEET/SEC.) =   7.78
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    311.00 =    1831.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.19
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.437
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.70      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D       11.50      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    12.20      SUBAREA RUNOFF(CFS) =   24.49
 EFFECTIVE AREA(ACRES) =    21.10    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       21.1       PEAK FLOW RATE(CFS) =     42.41

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1051.10  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.03
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      42.41
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   12.41
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   12.41
  RAINFALL INTENSITY(INCH/HR) =   2.41
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      21.10
  TOTAL STREAM AREA(ACRES) =      21.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      42.41

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      239.64   12.31    2.423  0.20( 0.11) 0.54      73.0     300.00
      1      253.82   14.49    2.206  0.20( 0.11) 0.54      84.8     303.00
      2       42.41   12.41    2.411  0.20( 0.20) 1.00      21.1     308.00

  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      281.91   12.31    2.423  0.20( 0.13) 0.65      93.9     300.00
      2      282.74   12.41    2.411  0.20( 0.13) 0.65      94.7     308.00
      3      292.30   14.49    2.206  0.20( 0.13) 0.63     105.9     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     292.30    Tc(MIN.) =    14.49
  EFFECTIVE AREA(ACRES) =     105.94   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =      179.4
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1050.00  DOWNSTREAM(FEET) =  1025.50
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  30.21
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     292.30
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   14.71
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   14.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.187
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.80      0.20      0.100    75
  SCHOOL                     D        2.40      0.20      0.600    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     3.20      SUBAREA RUNOFF(CFS) =     6.03
  EFFECTIVE AREA(ACRES) =    109.14   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =      182.6      PEAK FLOW RATE(CFS) =     292.30
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   14.71
  RAINFALL INTENSITY(INCH/HR) =   2.19
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.63
  EFFECTIVE STREAM AREA(ACRES) =     109.14
  TOTAL STREAM AREA(ACRES) =     182.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     292.30

****************************************************************************
  FLOW PROCESS FROM NODE    333.10 TO NODE    333.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1144.00  DOWNSTREAM(FEET) =   1094.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.892
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.746
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        1.00      0.20      1.000    83    9.89
```

EXISTING CONDITION, DRAINAGE AREA "A"
10-YEAR STORM, HIGH CONFIDENCE

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.29
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.29

****************************************************************************
  FLOW PROCESS FROM NODE    333.11 TO NODE    333.20 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1094.00  DOWNSTREAM(FEET) =   1075.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   275.00   CHANNEL SLOPE =  0.0684
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.29
  FLOW VELOCITY(FEET/SEC) =   4.63 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.99   Tc(MIN.) =   10.88
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.20 =     575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.20 TO NODE    333.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.88
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.600
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        5.50      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =   11.88
  EFFECTIVE AREA(ACRES) =      6.50   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.5       PEAK FLOW RATE(CFS) =      14.04

****************************************************************************
  FLOW PROCESS FROM NODE    333.20 TO NODE    333.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1075.20  DOWNSTREAM(FEET) =   1032.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   135.00   CHANNEL SLOPE =  0.3200
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      14.04
  FLOW VELOCITY(FEET/SEC.) =  23.47   FLOW DEPTH(FEET) =   0.77
  TRAVEL TIME(MIN.) =   0.10   Tc(MIN.) =   10.98
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.30 =     710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.30 TO NODE    333.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1032.00  DOWNSTREAM ELEVATION(FEET) = 1027.00
  STREET LENGTH(FEET) =   123.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.36
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   16.60
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.79
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.66
  STREET FLOW TRAVEL TIME(MIN.) =   0.35   Tc(MIN.) =   11.33
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.540
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.60      0.20      0.100    75
  PUBLIC PARK                 D        0.60      0.20      0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     2.64
  EFFECTIVE AREA(ACRES) =      7.70    AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =      16.33

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.07
  FLOW VELOCITY(FEET/SEC.) =  5.84   DEPTH*VELOCITY(FT*FT/SEC.) =   2.73
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.00 =     833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   11.33
  RAINFALL INTENSITY(INCH/HR) =   2.54
  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.92
  EFFECTIVE STREAM AREA(ACRES) =       7.70
  TOTAL STREAM AREA(ACRES) =       7.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.33

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      281.91   12.53    2.398  0.20( 0.13) 0.64      97.1      300.00
      1      282.74   12.64    2.386  0.20( 0.13) 0.64      97.9      308.00
      1      292.30   14.71    2.187  0.20( 0.13) 0.63     109.1      303.00
      2       16.33   11.33    2.540  0.20( 0.18) 0.92       7.7      333.10
```

```
 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      287.22   11.33    2.540  0.20( 0.13) 0.66      95.5     333.10
     2      297.25   12.53    2.398  0.20( 0.13) 0.66     104.8     300.00
     3      298.00   12.64    2.386  0.20( 0.13) 0.66     105.6     308.00
     4      306.19   14.71    2.187  0.20( 0.13) 0.64     116.8     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     306.19    Tc(MIN.) =    14.71
 EFFECTIVE AREA(ACRES) =     116.84   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.64
 TOTAL AREA(ACRES) =      190.3
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1025.50  DOWNSTREAM(FEET) =  1024.00
 FLOW LENGTH(FEET) =   109.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  48.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.32
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     306.19
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   14.82
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   14.82
 RAINFALL INTENSITY(INCH/HR) =   2.18
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.64
 EFFECTIVE STREAM AREA(ACRES) =     116.84
 TOTAL STREAM AREA(ACRES) =     190.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     306.19

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    335.11 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   243.00
 ELEVATION DATA: UPSTREAM(FEET) =   1077.80  DOWNSTREAM(FEET) =   1075.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.680
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.439
 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        0.20      0.25      0.100    69    6.68
 PUBLIC PARK                 C        0.20      0.25      0.850    69   10.61
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA RUNOFF(CFS) =      1.20
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.20

****************************************************************************
 FLOW PROCESS FROM NODE    335.11 TO NODE    335.10 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1075.00  DOWNSTREAM ELEVATION(FEET) = 1070.00
 STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.95
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =    9.02
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.21
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.04
 STREET FLOW TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =    7.80
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.147
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.20      0.20      0.100    75
 PUBLIC PARK                 D        1.10      0.20      0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.735
 SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    3.51
 EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       4.60

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.13
 FLOW VELOCITY(FEET/SEC.) =  3.54   DEPTH*VELOCITY(FT*FT/SEC.) =   1.28
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.10 =     458.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.10 TO NODE    335.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1070.00  DOWNSTREAM ELEVATION(FEET) = 1048.00
  STREET LENGTH(FEET) =   588.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.20
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.23
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.79
  STREET FLOW TRAVEL TIME(MIN.) =   2.08   Tc(MIN.) =    9.88
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.748
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.60      0.20      0.100    75
  PUBLIC PARK                D        1.60      0.20      0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
  SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    5.19
  EFFECTIVE AREA(ACRES) =      3.90    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =       9.17

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  13.63
  FLOW VELOCITY(FEET/SEC.) =  4.95   DEPTH*VELOCITY(FT*FT/SEC.) =   2.01
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.20 =    1046.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.20 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1048.00  DOWNSTREAM(FEET) =  1024.00
  FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.91
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.17
  PIPE TRAVEL TIME(MIN.) =   0.69    Tc(MIN.) =   10.57
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    336.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.57
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.644
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 C        0.30      0.25      0.100    69
  PUBLIC PARK                C        0.10      0.25      0.850    69
  COMMERCIAL                 D        1.50      0.20      0.100    75
  PUBLIC PARK                D        1.50      0.20      0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.453
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    7.81
  EFFECTIVE AREA(ACRES) =      7.30    AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =        7.3        PEAK FLOW RATE(CFS) =      16.62

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   10.57
  RAINFALL INTENSITY(INCH/HR) =   2.64
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =       7.30
  TOTAL STREAM AREA(ACRES) =       7.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.62

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      287.22   11.44    2.526  0.20( 0.13) 0.66      95.5     333.10
      1      297.25   12.64    2.386  0.20( 0.13) 0.66     104.8     300.00
      1      298.00   12.75    2.375  0.20( 0.13) 0.66     105.6     308.00
      1      306.19   14.82    2.178  0.20( 0.13) 0.64     116.8     303.00
      2       16.62   10.57    2.644  0.20( 0.11) 0.56       7.3     335.00

  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      294.94   10.57    2.644  0.20( 0.13) 0.65      95.5     335.00
      2      303.06   11.44    2.526  0.20( 0.13) 0.66     102.8     333.10
      3      312.17   12.64    2.386  0.20( 0.13) 0.65     112.1     300.00
      4      312.85   12.75    2.375  0.20( 0.13) 0.65     112.9     308.00
      5      319.75   14.82    2.178  0.20( 0.13) 0.64     124.1     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     319.75    Tc(MIN.) =    14.82
  EFFECTIVE AREA(ACRES) =     124.14   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.64
  TOTAL AREA(ACRES) =      197.6
```

EXISTING CONDITION, DRAINAGE AREA "A"
10-YEAR STORM, HIGH CONFIDENCE

```
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1024.00  DOWNSTREAM(FEET) =   895.30
 FLOW LENGTH(FEET) =   549.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  51.25
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     319.75
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   15.00
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   15.00
 RAINFALL INTENSITY(INCH/HR) =   2.16
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.64
 EFFECTIVE STREAM AREA(ACRES) =     124.14
 TOTAL STREAM AREA(ACRES) =     197.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     319.75

****************************************************************************
 FLOW PROCESS FROM NODE    373.00 TO NODE    373.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =   1018.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.657
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.499
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.20      0.20      1.000    83   11.66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.48
 TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      2.48

****************************************************************************
 FLOW PROCESS FROM NODE    373.10 TO NODE    374.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1018.00  DOWNSTREAM(FEET) =    895.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.3098
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.454
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.80      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.31
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  17.32
 AVERAGE FLOW DEPTH(FEET) =   0.50   TRAVEL TIME(MIN.) =   0.38
 Tc(MIN.) =   12.04
 SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =    3.65
 EFFECTIVE AREA(ACRES) =     3.00    AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      3.0       PEAK FLOW RATE(CFS) =       6.08

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.57   FLOW VELOCITY(FEET/SEC.) =  18.90
 LONGEST FLOWPATH FROM NODE    373.00 TO NODE    374.00 =     696.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.04
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.454
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        7.30      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.30      SUBAREA RUNOFF(CFS) =   14.81
 EFFECTIVE AREA(ACRES) =    10.30    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       10.3       PEAK FLOW RATE(CFS) =      20.89

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   12.04
 RAINFALL INTENSITY(INCH/HR) =   2.45
 AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      10.30
 TOTAL STREAM AREA(ACRES) =      10.30
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      20.89

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR)  (INCH/HR)           (ACRES)    NODE
     1      294.94   10.75     2.618  0.20( 0.13) 0.65       95.5     335.00
     1      303.06   11.63     2.503  0.20( 0.13) 0.66      102.8     333.10
     1      312.17   12.82     2.367  0.20( 0.13) 0.65      112.1     300.00
     1      312.85   12.93     2.356  0.20( 0.13) 0.65      112.9     308.00
     1      319.75   15.00     2.164  0.20( 0.13) 0.64      124.1     303.00
     2       20.89   12.04     2.454  0.20( 0.20) 1.00       10.3     373.00

 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      314.96   10.75     2.618  0.20( 0.14) 0.68      104.7     335.00
     2      323.68   11.63     2.503  0.20( 0.14) 0.69      112.7     333.10
     3      327.11   12.04     2.454  0.20( 0.14) 0.69      116.3     373.00
     4      332.26   12.82     2.367  0.20( 0.14) 0.68      122.4     300.00
     5      332.83   12.93     2.356  0.20( 0.14) 0.68      123.2     308.00
     6      337.95   15.00     2.164  0.20( 0.13) 0.67      134.4     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     337.95    Tc(MIN.) =    15.00
 EFFECTIVE AREA(ACRES) =     134.44   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =      207.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    377.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   895.30  DOWNSTREAM(FEET) =   890.00
 FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  41.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.26
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     337.95
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   15.11
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   15.11
 RAINFALL INTENSITY(INCH/HR) =   2.15
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.67
 EFFECTIVE STREAM AREA(ACRES) =     134.44
 TOTAL STREAM AREA(ACRES) =     207.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     337.95

****************************************************************************
 FLOW PROCESS FROM NODE    375.00 TO NODE    376.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1140.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.544
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.986
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                 D        1.30      0.20      1.000    83    8.54
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.26
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.26

****************************************************************************
 FLOW PROCESS FROM NODE    376.00 TO NODE    377.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1036.00  DOWNSTREAM(FEET) =    882.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.2034
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.26
 FLOW VELOCITY(FEET/SEC) =   6.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.09   Tc(MIN.) =   10.63
 LONGEST FLOWPATH FROM NODE    375.00 TO NODE    377.00 =    1057.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.63
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.635
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                 D        4.70      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =   10.30
 EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      6.0       PEAK FLOW RATE(CFS) =      13.15

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   10.63
 RAINFALL INTENSITY(INCH/HR) =   2.63
 AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.00
 TOTAL STREAM AREA(ACRES) =       6.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.15

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      314.96   10.87    2.601  0.20( 0.14) 0.68     104.7     335.00
     1      323.68   11.75    2.489  0.20( 0.14) 0.69     112.7     333.10
     1      327.11   12.16    2.440  0.20( 0.14) 0.69     116.3     373.00
     1      332.26   12.94    2.355  0.20( 0.14) 0.68     122.4     300.00
     1      332.83   13.04    2.344  0.20( 0.14) 0.68     123.2     308.00
     1      337.95   15.11    2.154  0.20( 0.13) 0.67     134.4     303.00
     2       13.15   10.63    2.635  0.20( 0.20) 1.00       6.0     375.00

 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      325.33   10.63    2.635  0.20( 0.14) 0.70     108.4     375.00
     2      327.93   10.87    2.601  0.20( 0.14) 0.70     110.7     335.00
     3      336.04   11.75    2.489  0.20( 0.14) 0.70     118.7     333.10
     4      339.20   12.16    2.440  0.20( 0.14) 0.70     122.3     373.00
     5      343.90   12.94    2.355  0.20( 0.14) 0.70     128.4     300.00
     6      344.41   13.04    2.344  0.20( 0.14) 0.70     129.2     308.00
     7      348.50   15.11    2.154  0.20( 0.14) 0.68     140.4     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     348.50    Tc(MIN.) =    15.11
 EFFECTIVE AREA(ACRES) =     140.44   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.68
 TOTAL AREA(ACRES) =      213.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    381.00 TO NODE    382.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    992.00  DOWNSTREAM(FEET) =    914.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.20      0.25      1.000    77    9.05
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.10      0.20      1.000    83    9.05
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.14
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.14

****************************************************************************
 FLOW PROCESS FROM NODE    383.10 TO NODE    383.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1022.00  DOWNSTREAM(FEET) =   1008.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.730
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.950
 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                 D        0.50      0.20      0.850    75    8.73
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA RUNOFF(CFS) =      1.25
 TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.25

****************************************************************************
 FLOW PROCESS FROM NODE    383.20 TO NODE    383.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1008.00  DOWNSTREAM(FEET) =    988.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   347.00   CHANNEL SLOPE =  0.0576
 CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.846
 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        2.00      0.25      0.850    69
 PUBLIC PARK                 D        2.40      0.20      0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.22
 AVERAGE FLOW DEPTH(FEET) =   0.80   TRAVEL TIME(MIN.) =   0.57
 Tc(MIN.) =    9.30
 SUBAREA AREA(ACRES) =     4.40      SUBAREA RUNOFF(CFS) =   10.52
 EFFECTIVE AREA(ACRES) =     4.90    AREA-AVERAGED Fm(INCH/HR) =   0.19
 AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   0.85
 TOTAL AREA(ACRES) =      4.9       PEAK FLOW RATE(CFS) =     11.72

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
 DEPTH(FEET) =  0.99   FLOW VELOCITY(FEET/SEC.) =  11.85
 LONGEST FLOWPATH FROM NODE    383.10 TO NODE    383.00 =     647.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    384.10 TO NODE    384.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.627
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25     1.000    77   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.28
 TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.28

****************************************************************************
 FLOW PROCESS FROM NODE    385.10 TO NODE    385.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1105.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.896
 *  10 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.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.00      0.20     1.000    83    8.90
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.45
 TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.45

****************************************************************************
 FLOW PROCESS FROM NODE    385.20 TO NODE    385.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    980.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   390.00   CHANNEL SLOPE =  0.3205
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.45
 FLOW VELOCITY(FEET/SEC) =   4.27 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.52   Tc(MIN.) =   10.42
 LONGEST FLOWPATH FROM NODE    385.10 TO NODE    385.00 =     690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    385.00 TO NODE    385.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.42
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.666
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.30      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.30      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     5.76
 EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      3.6       PEAK FLOW RATE(CFS) =      7.97
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       3.6  TC(MIN.) =     10.42
 EFFECTIVE AREA(ACRES) =      3.60  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      7.97
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "B", 10-YEAR STORM HIGH CONFIDENCE     *
* PORTOLA TRACTS 15353 & 17300                                            *
* W.O. #3751-1                                                            *
 **************************************************************************

  FILE NAME: XB-10YR.DAT
  TIME/DATE OF STUDY: 19:25 01/03/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
  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) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1207.00  DOWNSTREAM(FEET) =   1142.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.386
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.830
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.80      0.20      1.000    83    9.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.89
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.89

**************************************************************************
  FLOW PROCESS FROM NODE       2.00 TO NODE       3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1142.00  DOWNSTREAM(FEET) =   1136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE =  0.0189
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.89
  FLOW VELOCITY(FEET/SEC) =   2.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.27   Tc(MIN.) =   11.65
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     618.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.65
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.500
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        2.80      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.80      SUBAREA RUNOFF(CFS) =     5.80
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.6       PEAK FLOW RATE(CFS) =       7.45

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       4.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1136.00  DOWNSTREAM(FEET) =   1124.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0320
  CHANNEL FLOW THRU SUBAREA(CFS) =      7.45
  FLOW VELOCITY(FEET/SEC) =   4.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =   13.16
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     993.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE       4.00 TO NODE       4.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
```

EXISTING CONDITION, DRAINAGE AREA "B"
10-YEAR STORM, HIGH CONFIDENCE

```
 MAINLINE Tc(MIN.) =   13.16
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.332
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.50      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        3.50      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.00     SUBAREA RUNOFF(CFS) =     9.46
 EFFECTIVE AREA(ACRES) =      8.60   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        8.6       PEAK FLOW RATE(CFS) =      16.36

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1124.00  DOWNSTREAM(FEET) =   1120.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0148
 CHANNEL FLOW THRU SUBAREA(CFS) =      16.36
 FLOW VELOCITY(FEET/SEC) =   3.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.11   Tc(MIN.) =   14.27
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1223.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.27
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.226
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.50      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.50     SUBAREA RUNOFF(CFS) =     8.21
 EFFECTIVE AREA(ACRES) =     13.10   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      23.75

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1120.60  DOWNSTREAM(FEET) =  1052.00
 FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.38
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.75
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   14.70
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1773.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1052.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0718
 CHANNEL FLOW THRU SUBAREA(CFS) =      23.75
 FLOW VELOCITY(FEET/SEC) =   8.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.18   Tc(MIN.) =   15.88
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    2369.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.88
 *  10 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
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.10      0.25      1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        5.40      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.50     SUBAREA RUNOFF(CFS) =     9.37
 EFFECTIVE AREA(ACRES) =     18.60   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       18.6       PEAK FLOW RATE(CFS) =      31.56

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   15.88
 RAINFALL INTENSITY(INCH/HR) =   2.09
 AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      18.60
 TOTAL STREAM AREA(ACRES) =      18.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      31.56

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   1242.00  DOWNSTREAM(FEET) =   1216.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.292
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.545
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.70      0.30      1.000    66   11.29
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.41
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.41

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1216.20  DOWNSTREAM(FEET) =   1188.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   460.00   CHANNEL SLOPE =  0.0613
 CHANNEL FLOW THRU SUBAREA(CFS) =      1.41
 FLOW VELOCITY(FEET/SEC) =   3.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.93   Tc(MIN.) =   13.22
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.22
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.325
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.60      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.80      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.40      SUBAREA RUNOFF(CFS) =     4.45
 EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       5.72

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1188.00  DOWNSTREAM(FEET) =   1107.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.1419
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      5.72
 FLOW VELOCITY(FEET/SEC) =   6.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.37   Tc(MIN.) =   14.59
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1325.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.59
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.198
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        4.80      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.20      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.00      SUBAREA RUNOFF(CFS) =    12.15
 EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       10.1       PEAK FLOW RATE(CFS) =      17.52

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1107.80  DOWNSTREAM(FEET) =   1082.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE =  0.0956
 CHANNEL FLOW THRU SUBAREA(CFS) =      17.52
 FLOW VELOCITY(FEET/SEC) =   8.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   15.09
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.09
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.156
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        5.70      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.30      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     6.60      SUBAREA RUNOFF(CFS) =    11.08
 EFFECTIVE AREA(ACRES) =     16.70   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       16.7       PEAK FLOW RATE(CFS) =      28.21
```

EXISTING CONDITION, DRAINAGE AREA "B"
10-YEAR STORM, HIGH CONFIDENCE

```
****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1082.00  DOWNSTREAM(FEET) =  1062.00
 FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.06
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      28.21
 PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   15.41
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   870.00   CHANNEL SLOPE =  0.0607
 CHANNEL FLOW THRU SUBAREA(CFS) =      28.21
 FLOW VELOCITY(FEET/SEC) =   8.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.79   Tc(MIN.) =   17.20
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.20
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.000
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C       10.30      0.25      1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.10      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.40      SUBAREA RUNOFF(CFS) =   19.63
 EFFECTIVE AREA(ACRES) =     29.10   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       29.1       PEAK FLOW RATE(CFS) =      45.50

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   17.20
 RAINFALL INTENSITY(INCH/HR) =   2.00
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      29.10
 TOTAL STREAM AREA(ACRES) =      29.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      45.50

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       31.56   15.88    2.094  0.21( 0.21) 1.00      18.6       1.00
     2       45.50   17.20    2.000  0.26( 0.26) 1.00      29.1       8.00

 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       75.84   15.88    2.094  0.24( 0.24) 1.00      45.5       1.00
     2       75.50   17.20    2.000  0.24( 0.24) 1.00      47.7       8.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      75.84    Tc(MIN.) =    15.88
 EFFECTIVE AREA(ACRES) =      45.47   AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       47.7
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1012.00  DOWNSTREAM(FEET) =    954.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.3222
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      75.84
 FLOW VELOCITY(FEET/SEC.) =  30.56   FLOW DEPTH(FEET) =   0.45
 TRAVEL TIME(MIN.) =   0.10   Tc(MIN.) =   15.98
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     14.00 =    2969.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     82.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    954.00  DOWNSTREAM(FEET) =    917.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0663
 CHANNEL FLOW THRU SUBAREA(CFS) =      75.84
 FLOW VELOCITY(FEET/SEC) =  11.26 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.83   Tc(MIN.) =   16.80
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     82.00 =    3527.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     82.00 TO NODE     82.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
  MAINLINE Tc(MIN.) =   16.80
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.027
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.10      0.25      1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D       29.30      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   29.40      SUBAREA RUNOFF(CFS) =   48.34
  EFFECTIVE AREA(ACRES) =     74.87   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       77.1       PEAK FLOW RATE(CFS) =     121.44
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        77.1  TC(MIN.) =     16.80
  EFFECTIVE AREA(ACRES) =     74.87  AREA-AVERAGED Fm(INCH/HR)=  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =     121.44

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      121.44   16.80    2.027  0.22( 0.22) 1.00      74.9        1.00
      2      119.02   18.12    1.941  0.23( 0.23) 1.00      77.1        8.00
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "B"
10-YEAR STORM, HIGH CONFIDENCE

```
************************************************************************
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                        Analysis prepared by:

                        HUNSAKER & ASSOCIATES
                              Irvine, Inc
                    Planning * Engineering * Surveying
            Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "C", 10-YEAR STORM HIGH CONFIDENCE  *
* PORTOLLA TRACTS 15353 & 17300                                        *
* W.O. #3751-1                                                         *
 ************************************************************************

  FILE NAME: XC-10YR.DAT
  TIME/DATE OF STUDY: 14:26 01/22/2013
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ======  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

************************************************************************
  FLOW PROCESS FROM NODE     113.00 TO NODE     114.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1128.00  DOWNSTREAM(FEET) =   1050.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    77    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.20      0.20      1.000    83    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.43
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.43

************************************************************************
  FLOW PROCESS FROM NODE     114.00 TO NODE     115.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   295.00   CHANNEL SLOPE =  0.1695
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.43
  FLOW VELOCITY(FEET/SEC) =   5.09 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   10.02
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    115.00 =     595.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     115.00 TO NODE     115.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   10.02
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.726
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        1.40      0.25      1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.60      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     3.00     SUBAREA RUNOFF(CFS) =     6.76
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.6       PEAK FLOW RATE(CFS) =       8.10

************************************************************************
  FLOW PROCESS FROM NODE     115.00 TO NODE     116.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    870.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1055.00   CHANNEL SLOPE =  0.1232
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      8.10
  FLOW VELOCITY(FEET/SEC) =   7.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.35   Tc(MIN.) =   12.36
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    116.00 =    1650.00 FEET.
```

EXISTING CONDITION, DRAINAGE AREA "C"
10-YEAR STORM, HIGH CONFIDENCE

```
****************************************************************************
  FLOW PROCESS FROM NODE     116.00 TO NODE     116.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    12.36
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.417
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D       13.20      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    13.60      SUBAREA RUNOFF(CFS) =    27.11
  EFFECTIVE AREA(ACRES) =     17.20   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       17.2       PEAK FLOW RATE(CFS) =      34.21
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       17.2  TC(MIN.) =     12.36
  EFFECTIVE AREA(ACRES) =     17.20  AREA-AVERAGED Fm(INCH/HR)=  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      34.21
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "C"
10-YEAR STORM, HIGH CONFIDENCE

```
 ************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************** DESCRIPTION OF STUDY **************************
* EXISTING HYDROLOGY, DRAINAGE AREA "D", 10-YEAR STORM HIGH CONFIDENCE     *
* PORTOLLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                            *
 ************************************************************************

  FILE NAME: XD-10YR.DAT
  TIME/DATE OF STUDY: 09:37 01/23/2013
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  300.00
  ELEVATION DATA: UPSTREAM(FEET) =  1130.00  DOWNSTREAM(FEET) =  1030.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.611
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.973
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.90      0.25      1.000    77    8.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.21
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      2.21

************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1030.00  DOWNSTREAM(FEET) =    990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.1619
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.21
  FLOW VELOCITY(FEET/SEC) =   5.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    9.35
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     547.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =    9.35
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.836
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        2.30      0.25      1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.30   SUBAREA RUNOFF(CFS) =     5.35
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.2    PEAK FLOW RATE(CFS) =      7.45

************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.10 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.1250
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.45
  FLOW VELOCITY(FEET/SEC) =   7.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.73   Tc(MIN.) =   10.08
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.10 =     867.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    202.10 TO NODE    202.10 IS CODE =  81
------------------------------------------------------------------------
```

EXISTING CONDITION, DRAINAGE AREA "D"
10-YEAR STORM, HIGH CONFIDENCE

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.08
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.717
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        2.20      0.25      1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.40      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    5.79
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      12.89

********************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1057.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.171
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.868
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.70      0.25      1.000    77    9.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.65
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.65

********************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1057.00  DOWNSTREAM(FEET) =   1026.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE =  0.2441
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.65
  FLOW VELOCITY(FEET/SEC) =   5.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.40   Tc(MIN.) =    9.58
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.10 =     427.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.10 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    9.58
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.798
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.92
  EFFECTIVE AREA(ACRES) =      1.10   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =      2.52

********************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.20 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1026.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   389.00   CHANNEL SLOPE =  0.1954
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.52
  FLOW VELOCITY(FEET/SEC) =   5.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.13   Tc(MIN.) =   10.71
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.20 =     816.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    204.20 TO NODE    204.20 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.624
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.40      0.30      1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.60      0.25      1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    4.21
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =      6.56

********************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1118.00  DOWNSTREAM(FEET) =   1062.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.782
```

EXISTING CONDITION, DRAINAGE AREA "D"
10-YEAR STORM, HIGH CONFIDENCE

```
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.80      0.25      1.000    77    9.67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.82
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.82

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    206.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1027.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.3182
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.82
 FLOW VELOCITY(FEET/SEC) =   5.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.34   Tc(MIN.) =   10.01
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    206.10 =     410.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    206.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.01
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.727
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.50      0.25      1.000    77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50     SUBAREA RUNOFF(CFS) =     1.11
 EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       1.3       PEAK FLOW RATE(CFS) =       2.90

****************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    207.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1027.00  DOWNSTREAM(FEET) =    930.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   423.00   CHANNEL SLOPE =  0.2293
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.90
 FLOW VELOCITY(FEET/SEC) =   5.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.20   Tc(MIN.) =   11.21
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =     833.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.21
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.556
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.30      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000    77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.90     SUBAREA RUNOFF(CFS) =     3.88
 EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       3.2       PEAK FLOW RATE(CFS) =       6.58

****************************************************************************
 FLOW PROCESS FROM NODE    200.10 TO NODE    200.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1134.00  DOWNSTREAM(FEET) =   1073.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.506
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.809
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        1.10      0.25      1.000    77    9.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.53
 TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      2.53

****************************************************************************
 FLOW PROCESS FROM NODE    200.20 TO NODE    200.30 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1073.00  DOWNSTREAM(FEET) =    990.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.1137
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.635
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.70      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        1.80      0.25      1.000    77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

EXISTING CONDITION, DRAINAGE AREA "D"
10-YEAR STORM, HIGH CONFIDENCE

```
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.20
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.84
 AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   1.12
 Tc(MIN.) =   10.63
 SUBAREA AREA(ACRES) =     2.50       SUBAREA RUNOFF(CFS) =    5.34
 EFFECTIVE AREA(ACRES) =      3.60     AREA-AVERAGED Fm(INCH/HR) =   0.26
 AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        3.6          PEAK FLOW RATE(CFS) =       7.70

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.27   FLOW VELOCITY(FEET/SEC.) =  12.46
 LONGEST FLOWPATH FROM NODE    200.10 TO NODE    200.30 =    1030.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   10.63
 RAINFALL INTENSITY(INCH/HR) =   2.64
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       3.60
 TOTAL STREAM AREA(ACRES) =       3.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.70

****************************************************************************
 FLOW PROCESS FROM NODE    200.31 TO NODE    200.32 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1238.00  DOWNSTREAM(FEET) =   1204.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.627
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.40      0.20      1.000    83   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.87
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.87

****************************************************************************
 FLOW PROCESS FROM NODE    200.32 TO NODE    200.33 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1204.00  DOWNSTREAM(FEET) =   1150.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE =  0.3253
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.87
 FLOW VELOCITY(FEET/SEC) =   3.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =   11.55
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.33 =     466.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.33 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.55
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.512
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.20      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.30      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =     1.02
 EFFECTIVE AREA(ACRES) =      0.90    AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        0.9          PEAK FLOW RATE(CFS) =       1.86

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.34 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =   1100.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   159.00   CHANNEL SLOPE =  0.3145
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.86
 FLOW VELOCITY(FEET/SEC) =   5.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.49   Tc(MIN.) =   12.05
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.34 =     625.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.34 TO NODE    200.34 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.05
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.453
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.80      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.90      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =     3.37
 EFFECTIVE AREA(ACRES) =      2.60    AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6          PEAK FLOW RATE(CFS) =       5.18
```

EXISTING CONDITION, DRAINAGE AREA "D"
10-YEAR STORM, HIGH CONFIDENCE

```
****************************************************************************
 FLOW PROCESS FROM NODE    200.34 TO NODE     82.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =   1085.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0791
 CHANNEL FLOW THRU SUBAREA(CFS) =       5.18
 FLOW VELOCITY(FEET/SEC) =   5.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =   12.57
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE     82.10 =     812.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     82.10 TO NODE     82.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.57
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.394
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        2.00      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.40      0.25      1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.10      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     3.50      SUBAREA RUNOFF(CFS) =     6.71
 EFFECTIVE AREA(ACRES) =      6.10   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         6.1      PEAK FLOW RATE(CFS) =      11.76

****************************************************************************
 FLOW PROCESS FROM NODE     82.10 TO NODE    200.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1085.20  DOWNSTREAM(FEET) =    990.00
 FLOW LENGTH(FEET) =   392.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.82
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.76
 PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   12.85
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   12.85
 RAINFALL INTENSITY(INCH/HR) =   2.36
 AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.10
 TOTAL STREAM AREA(ACRES) =       6.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.76

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1        7.70   10.63    2.635  0.26( 0.26) 1.00       3.6     200.10
     2       11.76   12.85    2.363  0.25( 0.25) 1.00       6.1     200.31

 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       18.67   10.63    2.635  0.26( 0.26) 1.00       8.6     200.10
     2       18.57   12.85    2.363  0.26( 0.26) 1.00       9.7     200.31

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      18.67    Tc(MIN.) =    10.63
 EFFECTIVE AREA(ACRES) =       8.64   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         9.7
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.40 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    970.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1250
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      18.67
 FLOW VELOCITY(FEET/SEC) =   9.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.29   Tc(MIN.) =   10.92
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.40 =    1364.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.40 TO NODE    200.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.92
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.595
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.90      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.20      0.25      1.000    77
```

EXISTING CONDITION, DRAINAGE AREA "D"
10-YEAR STORM, HIGH CONFIDENCE

```
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.50      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    3.36
  EFFECTIVE AREA(ACRES) =     10.24   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.3       PEAK FLOW RATE(CFS) =      21.56

****************************************************************************
  FLOW PROCESS FROM NODE    200.40 TO NODE    200.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    970.00  DOWNSTREAM(FEET) =    949.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   156.00   CHANNEL SLOPE =  0.1346
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.56
  FLOW VELOCITY(FEET/SEC) =   9.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.27   Tc(MIN.) =   11.18
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.50 =    1520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.50 TO NODE    200.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.18
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.559
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                 B        0.60      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                 C        0.30      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                 D        1.20      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.10      SUBAREA RUNOFF(CFS) =    4.39
  EFFECTIVE AREA(ACRES) =     12.34   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.4       PEAK FLOW RATE(CFS) =      25.62
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       13.4  TC(MIN.) =     11.18
  EFFECTIVE AREA(ACRES) =     12.34  AREA-AVERAGED Fm(INCH/HR)=  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      25.62

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       25.62   11.18    2.559  0.25( 0.25) 1.00      12.3     200.10
      2       24.77   13.41    2.307  0.25( 0.25) 1.00      13.4     200.31
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************
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                          Analysis prepared by:

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  ************************* DESCRIPTION OF STUDY *************************
 * EXISTING HYDROLOGY, AREAS "E" & "F", 10-YEAR STORM HIGH CONFIDENCE      *
 * PORTOLA TRACTS 15353 & 17300                                            *
 * W.O. #3751-1                                                           *
  ************************************************************************

  FILE NAME: X-EF-10.DAT
  TIME/DATE OF STUDY: 18:29 01/23/2013
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   45.0     40.0    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

************************************************************************
  FLOW PROCESS FROM NODE     400.00 TO NODE     400.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1078.00  DOWNSTREAM(FEET) =   1072.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.509
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.490
  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                 B        0.50      0.30      0.850    56   10.34
  COMMERCIAL                  B        0.20      0.30      0.100    56    6.51
  COMMERCIAL                  C        0.20      0.25      0.100    69    6.51
  PUBLIC PARK                 C        0.10      0.25      0.850    69   10.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.550
  SUBAREA RUNOFF(CFS) =      3.00
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.00

************************************************************************
  FLOW PROCESS FROM NODE     400.10 TO NODE     401.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1072.00  DOWNSTREAM ELEVATION(FEET) = 1058.00
  STREET LENGTH(FEET) =   321.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   10.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.62
  STREET FLOW TRAVEL TIME(MIN.) =   1.15   Tc(MIN.) =    7.66
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.179
  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        0.40      0.30      0.850    56
  PUBLIC PARK                 C        1.10      0.25      0.850    69
  COMMERCIAL                  C        0.30      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    4.84
  EFFECTIVE AREA(ACRES) =      2.80    AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        2.8        PEAK FLOW RATE(CFS) =       7.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.07
  FLOW VELOCITY(FEET/SEC.) =  5.06   DEPTH*VELOCITY(FT*FT/SEC.) =   1.91
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    401.00 =     621.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE     401.00 TO NODE     402.00 IS CODE =  62
------------------------------------------------------------------------
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
UPSTREAM ELEVATION(FEET) = 1058.00  DOWNSTREAM ELEVATION(FEET) =  990.00
STREET LENGTH(FEET) =   803.00   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 45.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.018
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.89
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.39
  HALFSTREET FLOOD WIDTH(FEET) =   12.77
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.20
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.81
STREET FLOW TRAVEL TIME(MIN.) =   1.86   Tc(MIN.) =    9.52
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.807
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"        B        0.60      0.30      0.500    56
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        C        0.20      0.25      0.500    69
PUBLIC PARK                 D        2.20      0.20      0.850    75
COMMERCIAL                  D        0.60      0.20      0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.647
SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    8.64
EFFECTIVE AREA(ACRES) =      6.40    AREA-AVERAGED Fm(INCH/HR) =  0.16
AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.65
TOTAL AREA(ACRES) =        6.4        PEAK FLOW RATE(CFS) =      15.27

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.26
FLOW VELOCITY(FEET/SEC.) =  7.60   DEPTH*VELOCITY(FT*FT/SEC.) =   3.17
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =    1424.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    9.52
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.807
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        0.30      0.30      0.850    56
NATURAL FAIR COVER
"OPEN BRUSH"                B        0.20      0.30      1.000    66
PUBLIC PARK                 D        0.60      0.20      0.850    75
NATURAL FAIR COVER
"OPEN BRUSH"                D        7.10      0.20      1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =   19.23
EFFECTIVE AREA(ACRES) =    14.60   AREA-AVERAGED Fm(INCH/HR) =  0.18
AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.84
TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      34.49

****************************************************************************
FLOW PROCESS FROM NODE    500.00 TO NODE    500.10 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    948.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.815
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.758
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"                D        1.30      0.20      1.000    83    9.81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      2.99
TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      2.99

****************************************************************************
FLOW PROCESS FROM NODE    500.10 TO NODE    501.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    948.00  DOWNSTREAM(FEET) =    920.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.1000
CHANNEL FLOW THRU SUBAREA(CFS) =       2.99
FLOW VELOCITY(FEET/SEC) =   5.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.79   Tc(MIN.) =   10.60
LONGEST FLOWPATH FROM NODE    500.00 TO NODE    501.00 =     580.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   10.60
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.639
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                B        1.10      0.30      1.000    66
NATURAL FAIR COVER
"OPEN BRUSH"                D        0.70      0.20      1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    3.85
```

```
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       6.71
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        3.1  TC(MIN.) =     10.60
  EFFECTIVE AREA(ACRES) =      3.10  AREA-AVERAGED Fm(INCH/HR)=  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       6.71
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "A", 25-YEAR STORM HIGH CONFIDENCE     *
* PORTOLA TRACTS 15353 & 17300                                            *
* W.O. #3751-1                                                            *
 **************************************************************************

  FILE NAME: XA-25YR.DAT
  TIME/DATE OF STUDY: 17:25 12/28/2012
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   45.0     40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1132.30  DOWNSTREAM(FEET) =   1088.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.148
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.231
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        2.00      0.20      1.000    83   10.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.46
  TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      5.46

**************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1088.30  DOWNSTREAM(FEET) =   1077.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0286
  CHANNEL FLOW THRU SUBAREA(CFS) =      5.46
  FLOW VELOCITY(FEET/SEC) =   3.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.78   Tc(MIN.) =   11.92
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     688.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.92
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.950
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        4.60      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.60      SUBAREA RUNOFF(CFS) =    11.38
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      6.6       PEAK FLOW RATE(CFS) =      16.33

**************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1077.20  DOWNSTREAM(FEET) =  1073.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.21
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.33
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.08
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   1
--------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.08
  RAINFALL INTENSITY(INCH/HR) =   2.93
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.60
  TOTAL STREAM AREA(ACRES) =       6.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.33

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   14.35   RAINFALL INTENSITY(INCH/HR) =  2.66
  EFFECTIVE AREA(ACRES) =    95.67
  TOTAL AREA(ACRES) =   151.43         PEAK FLOW RATE(CFS) =    296.70
  AREA-AVERAGED Fm(INCH/HR) =   0.10  AREA-AVERAGED Fp(INCH/HR) =   0.20
  AREA-AVERAGED Ap =  0.50
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   14.35
  RAINFALL INTENSITY(INCH/HR) =   2.66
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      95.67
  TOTAL STREAM AREA(ACRES) =     151.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     296.70

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       16.33   12.08    2.928  0.20( 0.20) 1.00       6.6      300.00
      2      296.70   14.35    2.656  0.20( 0.10) 0.50      95.7      303.00

  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      292.64   12.08    2.928  0.20( 0.11) 0.54      87.1      300.00
      2      311.40   14.35    2.656  0.20( 0.11) 0.53     102.3      303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     311.40    Tc(MIN.) =    14.35
  EFFECTIVE AREA(ACRES) =     102.27   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =      158.0
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.00  DOWNSTREAM(FEET) =  1056.00
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  32.19
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     311.40
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   14.47
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =    1031.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.47
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.644
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.30      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     0.71
  EFFECTIVE AREA(ACRES) =    102.57   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =      158.3       PEAK FLOW RATE(CFS) =     311.40
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1056.00  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  43.07
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     311.40
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   14.48
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    307.00 =    1071.00 FEET.

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  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
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 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   14.48
 RAINFALL INTENSITY(INCH/HR) =   2.64
 AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.53
 EFFECTIVE STREAM AREA(ACRES) =     102.57
 TOTAL STREAM AREA(ACRES) =     158.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     311.40

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1103.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.756
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.513
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.80      0.20     1.000     83    8.76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.39
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.39

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1103.00  DOWNSTREAM(FEET) =   1067.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   644.00   CHANNEL SLOPE =  0.0548
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.252
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        3.40      0.20     1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.06
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.41
 AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   1.28
 Tc(MIN.) =   10.03
 SUBAREA AREA(ACRES) =     3.40      SUBAREA RUNOFF(CFS) =     9.34
 EFFECTIVE AREA(ACRES) =     4.20     AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      4.2        PEAK FLOW RATE(CFS) =     11.54

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   9.91
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =     944.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1067.70  DOWNSTREAM(FEET) =   1052.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0177
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.944
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.70      0.20     1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     17.35
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.65
 AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   1.93
 Tc(MIN.) =   11.96
 SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =    11.61
 EFFECTIVE AREA(ACRES) =     8.90     AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      8.9        PEAK FLOW RATE(CFS) =     21.98

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.67   FLOW VELOCITY(FEET/SEC.) =   8.24
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    311.00 =    1831.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.96
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.944
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.70      0.30     1.000     66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D       11.50      0.20     1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    12.20      SUBAREA RUNOFF(CFS) =    30.07
 EFFECTIVE AREA(ACRES) =     21.10    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       21.1       PEAK FLOW RATE(CFS) =     52.04

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
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  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1051.10  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.53
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      52.04
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   12.18
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   12.18
  RAINFALL INTENSITY(INCH/HR) =   2.91
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      21.10
  TOTAL STREAM AREA(ACRES) =      21.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      52.04

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      292.64   12.21    2.910  0.20( 0.11) 0.54      87.4     300.00
      1      311.40   14.48    2.642  0.20( 0.11) 0.53     102.6     303.00
      2       52.04   12.18    2.914  0.20( 0.20) 1.00      21.1     308.00

  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      344.35   12.18    2.914  0.20( 0.13) 0.63     108.3     308.00
      2      344.60   12.21    2.910  0.20( 0.13) 0.63     108.5     300.00
      3      358.22   14.48    2.642  0.20( 0.12) 0.61     123.7     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     358.22    Tc(MIN.) =    14.48
  EFFECTIVE AREA(ACRES) =     123.67   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.61
  TOTAL AREA(ACRES) =      179.4
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1050.00  DOWNSTREAM(FEET) =  1025.50
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  38.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.64
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     358.22
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   14.70
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   14.70
  *  25 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
  COMMERCIAL                 D        0.80      0.20      0.100    75
  SCHOOL                     D        2.40      0.20      0.600    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     3.20      SUBAREA RUNOFF(CFS) =     7.27
  EFFECTIVE AREA(ACRES) =    126.87   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.61
  TOTAL AREA(ACRES) =      182.6      PEAK FLOW RATE(CFS) =     358.22
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   14.70
  RAINFALL INTENSITY(INCH/HR) =   2.62
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.61
  EFFECTIVE STREAM AREA(ACRES) =     126.87
  TOTAL STREAM AREA(ACRES) =     182.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     358.22

****************************************************************************
  FLOW PROCESS FROM NODE    333.10 TO NODE    333.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1144.00  DOWNSTREAM(FEET) =   1094.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.892
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.278
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        1.00      0.20      1.000    83    9.89
```

EXISTING CONDITION, DRAINAGE AREA "A"
25-YEAR STORM, HIGH CONFIDENCE

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.77
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.77

****************************************************************************
  FLOW PROCESS FROM NODE    333.11 TO NODE    333.20 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1094.00  DOWNSTREAM(FEET) =   1075.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   275.00   CHANNEL SLOPE =  0.0684
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.77
  FLOW VELOCITY(FEET/SEC) =   4.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.95   Tc(MIN.) =   10.84
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.20 =     575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.20 TO NODE    333.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.84
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.113
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        5.50      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =   14.42
  EFFECTIVE AREA(ACRES) =      6.50   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       6.5       PEAK FLOW RATE(CFS) =      17.04

****************************************************************************
  FLOW PROCESS FROM NODE    333.20 TO NODE    333.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1075.20  DOWNSTREAM(FEET) =   1032.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   135.00   CHANNEL SLOPE =  0.3200
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      17.04
  FLOW VELOCITY(FEET/SEC.) =  24.81   FLOW DEPTH(FEET) =   0.83
  TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =   10.93
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.30 =     710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.30 TO NODE    333.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1032.00  DOWNSTREAM ELEVATION(FEET) = 1027.00
  STREET LENGTH(FEET) =   123.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.63
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.48
    HALFSTREET FLOOD WIDTH(FEET) =   18.01
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.03
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.92
  STREET FLOW TRAVEL TIME(MIN.) =   0.34   Tc(MIN.) =   11.27
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.045
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.60      0.20      0.100    75
  PUBLIC PARK                 D        0.60      0.20      0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     3.19
  EFFECTIVE AREA(ACRES) =      7.70   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =       7.7       PEAK FLOW RATE(CFS) =      19.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.48
  FLOW VELOCITY(FEET/SEC.) =  6.12   DEPTH*VELOCITY(FT*FT/SEC.) =   3.01
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.00 =     833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   11.27
  RAINFALL INTENSITY(INCH/HR) =   3.04
  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.92
  EFFECTIVE STREAM AREA(ACRES) =       7.70
  TOTAL STREAM AREA(ACRES) =       7.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.83

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      344.35   12.39     2.886  0.20( 0.13) 0.62     111.5     308.00
      1      344.60   12.42     2.882  0.20( 0.13) 0.62     111.7     300.00
      1      358.22   14.70     2.620  0.20( 0.12) 0.61     126.9     303.00
      2       19.83   11.27     3.045  0.20( 0.18) 0.92       7.7     333.10
```

```
 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      351.11   11.27    3.045  0.20( 0.13) 0.64      109.1     333.10
     2      363.08   12.39    2.886  0.20( 0.13) 0.64      119.2     308.00
     3      363.30   12.42    2.882  0.20( 0.13) 0.64      119.4     300.00
     4      375.10   14.70    2.620  0.20( 0.13) 0.63      134.6     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     375.10    Tc(MIN.) =    14.70
 EFFECTIVE AREA(ACRES) =     134.57   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.63
 TOTAL AREA(ACRES) =      190.3
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1025.50  DOWNSTREAM(FEET) =  1024.00
 FLOW LENGTH(FEET) =   109.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  50.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.31
 ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     375.10
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   14.79
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   14.79
 RAINFALL INTENSITY(INCH/HR) =   2.61
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.63
 EFFECTIVE STREAM AREA(ACRES) =     134.57
 TOTAL STREAM AREA(ACRES) =     190.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     375.10

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    335.11 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   243.00
 ELEVATION DATA: UPSTREAM(FEET) =   1077.80  DOWNSTREAM(FEET) =   1075.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.680
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.094
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  C        0.20      0.25      0.100    69    6.68
 PUBLIC PARK                 C        0.20      0.25      0.850    69   10.61
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA RUNOFF(CFS) =      1.43
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.43

****************************************************************************
 FLOW PROCESS FROM NODE    335.11 TO NODE    335.10 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1075.00  DOWNSTREAM ELEVATION(FEET) = 1070.00
 STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.55
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.34
   HALFSTREET FLOOD WIDTH(FEET) =    9.88
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.33
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.13
 STREET FLOW TRAVEL TIME(MIN.) =   1.08   Tc(MIN.) =    7.76
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.762
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  D        0.20      0.20      0.100    75
 PUBLIC PARK                 D        1.10      0.20      0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.735
 SUBAREA AREA(ACRES) =     1.30      SUBAREA RUNOFF(CFS) =     4.23
 EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =        5.54

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.15
 FLOW VELOCITY(FEET/SEC.) =  3.67   DEPTH*VELOCITY(FT*FT/SEC.) =   1.39
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.10 =     458.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.10 TO NODE    335.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1070.00  DOWNSTREAM ELEVATION(FEET) = 1048.00
  STREET LENGTH(FEET) =   588.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.69
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.32
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.96
  STREET FLOW TRAVEL TIME(MIN.) =   2.01   Tc(MIN.) =    9.76
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.303
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.60      0.20      0.100    75
  PUBLIC PARK                 D        1.60      0.20      0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
  SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    6.28
  EFFECTIVE AREA(ACRES) =      3.90    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =      11.12

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.80
  FLOW VELOCITY(FEET/SEC.) =  5.17   DEPTH*VELOCITY(FT*FT/SEC.) =   2.21
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.20 =    1046.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.20 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1048.00  DOWNSTREAM(FEET) =  1024.00
  FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.50
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.12
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =   10.41
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    336.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.41
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.184
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.30      0.25      0.100    69
  PUBLIC PARK                 C        0.10      0.25      0.850    69
  COMMERCIAL                  D        1.50      0.20      0.100    75
  PUBLIC PARK                 D        1.50      0.20      0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.453
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    9.46
  EFFECTIVE AREA(ACRES) =      7.30   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =        7.3       PEAK FLOW RATE(CFS) =      20.17

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   10.41
  RAINFALL INTENSITY(INCH/HR) =   3.18
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =       7.30
  TOTAL STREAM AREA(ACRES) =       7.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      20.17

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      351.11   11.37    3.029  0.20( 0.13) 0.64     109.1     333.10
      1      363.08   12.49    2.873  0.20( 0.13) 0.64     119.2     308.00
      1      363.30   12.53    2.868  0.20( 0.13) 0.64     119.4     300.00
      1      375.10   14.79    2.611  0.20( 0.13) 0.63     134.6     303.00
      2       20.17   10.41    3.184  0.20( 0.11) 0.56       7.3     335.00

  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      358.84   10.41    3.184  0.20( 0.13) 0.64     107.2     335.00
      2      370.26   11.37    3.029  0.20( 0.13) 0.64     116.4     333.10
      3      381.20   12.49    2.873  0.20( 0.13) 0.64     126.5     308.00
      4      381.39   12.53    2.868  0.20( 0.13) 0.64     126.7     300.00
      5      391.50   14.79    2.611  0.20( 0.13) 0.62     141.9     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     391.50    Tc(MIN.) =    14.79
  EFFECTIVE AREA(ACRES) =     141.87   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.62
  TOTAL AREA(ACRES) =      197.6
```

EXISTING CONDITION, DRAINAGE AREA "A"
25-YEAR STORM, HIGH CONFIDENCE

```
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1024.00  DOWNSTREAM(FEET) =   895.30
 FLOW LENGTH(FEET) =   549.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  53.89
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     391.50
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   14.96
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   14.96
 RAINFALL INTENSITY(INCH/HR) =   2.59
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.62
 EFFECTIVE STREAM AREA(ACRES) =     141.87
 TOTAL STREAM AREA(ACRES) =     197.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     391.50

****************************************************************************
 FLOW PROCESS FROM NODE    373.00 TO NODE    373.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =   1018.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.657
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.988
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.20      0.20      1.000    83   11.66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.01
 TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      3.01

****************************************************************************
 FLOW PROCESS FROM NODE    373.10 TO NODE    374.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1018.00  DOWNSTREAM(FEET) =    895.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.3098
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.936
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.80      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.23
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  18.13
 AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   0.36
 Tc(MIN.) =   12.02
 SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =    4.43
 EFFECTIVE AREA(ACRES) =     3.00    AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       3.0       PEAK FLOW RATE(CFS) =       7.39

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =  20.02
 LONGEST FLOWPATH FROM NODE    373.00 TO NODE    374.00 =     696.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.02
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.936
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        7.30      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.30      SUBAREA RUNOFF(CFS) =   17.98
 EFFECTIVE AREA(ACRES) =    10.30    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       10.3       PEAK FLOW RATE(CFS) =      25.36

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   12.02
 RAINFALL INTENSITY(INCH/HR) =   2.94
 AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      10.30
 TOTAL STREAM AREA(ACRES) =      10.30
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.36

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      358.84   10.59     3.154  0.20( 0.13) 0.64      107.2     335.00
     1      370.26   11.55     3.003  0.20( 0.13) 0.64      116.4     333.10
     1      381.20   12.66     2.851  0.20( 0.13) 0.64      126.5     308.00
     1      381.39   12.70     2.846  0.20( 0.13) 0.64      126.7     300.00
     1      391.50   14.96     2.594  0.20( 0.13) 0.62      141.9     303.00
     2       25.36   12.02     2.936  0.20( 0.20) 1.00       10.3     373.00

 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      382.97   10.59     3.154  0.20( 0.13) 0.67      116.3     335.00
     2      395.23   11.55     3.003  0.20( 0.13) 0.67      126.3     333.10
     3      400.26   12.02     2.936  0.20( 0.13) 0.67      131.0     373.00
     4      405.77   12.66     2.851  0.20( 0.13) 0.66      136.8     308.00
     5      405.92   12.70     2.846  0.20( 0.13) 0.66      137.0     300.00
     6      413.69   14.96     2.594  0.20( 0.13) 0.65      152.2     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     413.69    Tc(MIN.) =    14.96
 EFFECTIVE AREA(ACRES) =     152.17   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.65
 TOTAL AREA(ACRES) =      207.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    377.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   895.30  DOWNSTREAM(FEET) =   890.00
 FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  46.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.28
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     413.69
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   15.08
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   15.08
 RAINFALL INTENSITY(INCH/HR) =   2.58
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.65
 EFFECTIVE STREAM AREA(ACRES) =     152.17
 TOTAL STREAM AREA(ACRES) =     207.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     413.69

****************************************************************************
 FLOW PROCESS FROM NODE    375.00 TO NODE    376.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1140.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.544
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.562
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.30      0.20      1.000     83    8.54
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.93
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.93

****************************************************************************
 FLOW PROCESS FROM NODE    376.00 TO NODE    377.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1036.00  DOWNSTREAM(FEET) =    882.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.2034
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      3.93
 FLOW VELOCITY(FEET/SEC) =   6.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.00   Tc(MIN.) =   10.54
 LONGEST FLOWPATH FROM NODE    375.00 TO NODE    377.00 =    1057.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.54
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.162
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.70      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =   12.53
 EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      6.0       PEAK FLOW RATE(CFS) =      16.00

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   10.54
RAINFALL INTENSITY(INCH/HR) =   3.16
AREA-AVERAGED Fm(INCH/HR) =  0.20
AREA-AVERAGED Fp(INCH/HR) =  0.20
AREA-AVERAGED Ap =  1.00
EFFECTIVE STREAM AREA(ACRES) =       6.00
TOTAL STREAM AREA(ACRES) =       6.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.00

** CONFLUENCE DATA **
 STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
    1      382.97   10.70    3.135  0.20( 0.13) 0.67      116.3     335.00
    1      395.23   11.66    2.987  0.20( 0.13) 0.67      126.3     333.10
    1      400.26   12.13    2.921  0.20( 0.13) 0.67      131.0     373.00
    1      405.77   12.77    2.837  0.20( 0.13) 0.66      136.8     308.00
    1      405.92   12.81    2.832  0.20( 0.13) 0.66      137.0     300.00
    1      413.69   15.08    2.583  0.20( 0.13) 0.65      152.2     303.00
    2       16.00   10.54    3.162  0.20( 0.20) 1.00        6.0     375.00

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      396.61   10.54    3.162  0.20( 0.14) 0.68      120.5     375.00
    2      398.82   10.70    3.135  0.20( 0.14) 0.68      122.3     335.00
    3      410.28   11.66    2.987  0.20( 0.14) 0.68      132.3     333.10
    4      414.95   12.13    2.921  0.20( 0.14) 0.68      137.0     373.00
    5      420.01   12.77    2.837  0.20( 0.14) 0.68      142.8     308.00
    6      420.14   12.81    2.832  0.20( 0.14) 0.68      143.0     300.00
    7      426.56   15.08    2.583  0.20( 0.13) 0.66      158.2     303.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     426.56    Tc(MIN.) =    15.08
EFFECTIVE AREA(ACRES) =     158.17   AREA-AVERAGED Fm(INCH/HR) =  0.13
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
TOTAL AREA(ACRES) =      213.9
LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    381.00 TO NODE    382.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
ELEVATION DATA: UPSTREAM(FEET) =    992.00  DOWNSTREAM(FEET) =    914.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.448
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"                C        0.20      0.25      1.000    77    9.05
NATURAL FAIR COVER
"OPEN BRUSH"                D        1.10      0.20      1.000    83    9.05
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      3.79
TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.79

****************************************************************************
FLOW PROCESS FROM NODE    383.10 TO NODE    383.20 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
ELEVATION DATA: UPSTREAM(FEET) =   1022.00  DOWNSTREAM(FEET) =   1008.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.730
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.519
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                 D        0.50      0.20      0.850    75    8.73
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
SUBAREA RUNOFF(CFS) =      1.51
TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.51

****************************************************************************
FLOW PROCESS FROM NODE    383.20 TO NODE    383.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1008.00  DOWNSTREAM(FEET) =    988.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   347.00   CHANNEL SLOPE =  0.0576
CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   1.000
MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.401
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        2.00      0.25      0.850    69
PUBLIC PARK                 D        2.40      0.20      0.850    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.87
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.71
AVERAGE FLOW DEPTH(FEET) =   0.86   TRAVEL TIME(MIN.) =   0.54
Tc(MIN.) =    9.27
SUBAREA AREA(ACRES) =     4.40     SUBAREA RUNOFF(CFS) =   12.72
EFFECTIVE AREA(ACRES) =     4.90    AREA-AVERAGED Fm(INCH/HR) =   0.19
AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   0.85
TOTAL AREA(ACRES) =      4.9       PEAK FLOW RATE(CFS) =     14.17

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  1.07   FLOW VELOCITY(FEET/SEC.) =  12.49
  LONGEST FLOWPATH FROM NODE    383.10 TO NODE    383.00 =     647.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    384.10 TO NODE    384.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =   1036.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.138
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.60      0.25     1.000    77   10.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.56
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.56

****************************************************************************
  FLOW PROCESS FROM NODE    385.10 TO NODE    385.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1105.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.896
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.481
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.00      0.20     1.000    83    8.90
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.95
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.95

****************************************************************************
  FLOW PROCESS FROM NODE    385.20 TO NODE    385.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    980.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   390.00   CHANNEL SLOPE =  0.3205
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.95
  FLOW VELOCITY(FEET/SEC) =   4.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.43   Tc(MIN.) =   10.33
  LONGEST FLOWPATH FROM NODE    385.10 TO NODE    385.00 =     690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    385.00 TO NODE    385.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.33
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.200
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.30      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        2.30      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     7.01
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.6       PEAK FLOW RATE(CFS) =      9.71
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       3.6  TC(MIN.) =     10.33
  EFFECTIVE AREA(ACRES) =      3.60  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      9.71
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "A"
25-YEAR STORM, HIGH CONFIDENCE

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "B", 25-YEAR STORM HIGH CONFIDENCE     *
* PORTOLA TRACTS 15353 & 17300                                            *
* W.O. #3751-1                                                            *
 ************************************************************************

  FILE NAME: XB-25YR.DAT
  TIME/DATE OF STUDY: 19:18 01/03/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

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

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

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1207.00  DOWNSTREAM(FEET) =   1142.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.386
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.377
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.80      0.20      1.000    83    9.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.29
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.29

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1142.00  DOWNSTREAM(FEET) =   1136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE =  0.0189
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.29
  FLOW VELOCITY(FEET/SEC) =   2.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.18   Tc(MIN.) =   11.57
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     618.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.57
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.001
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        2.80      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.80      SUBAREA RUNOFF(CFS) =     7.06
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.6       PEAK FLOW RATE(CFS) =       9.07

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1136.00  DOWNSTREAM(FEET) =   1124.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0320
  CHANNEL FLOW THRU SUBAREA(CFS) =      9.07
  FLOW VELOCITY(FEET/SEC) =   4.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.43   Tc(MIN.) =   13.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     993.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
```

EXISTING CONDITION, DRAINAGE AREA "B"
25-YEAR STORM, HIGH CONFIDENCE

```
 MAINLINE Tc(MIN.) =   13.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.809
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.50      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        3.50      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.00      SUBAREA RUNOFF(CFS) =   11.61
 EFFECTIVE AREA(ACRES) =      8.60   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        8.6       PEAK FLOW RATE(CFS) =      20.06

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1124.00  DOWNSTREAM(FEET) =   1120.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0148
 CHANNEL FLOW THRU SUBAREA(CFS) =      20.06
 FLOW VELOCITY(FEET/SEC) =   3.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.05   Tc(MIN.) =   14.05
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1223.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.05
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.688
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.50      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.50      SUBAREA RUNOFF(CFS) =   10.08
 EFFECTIVE AREA(ACRES) =     13.10   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      29.20

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1120.60  DOWNSTREAM(FEET) =  1052.00
 FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.26
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      29.20
 PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   14.46
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1773.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1052.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0718
 CHANNEL FLOW THRU SUBAREA(CFS) =      29.20
 FLOW VELOCITY(FEET/SEC) =   8.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =   15.58
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    2369.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.58
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.535
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.10      0.25      1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        5.40      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =   11.56
 EFFECTIVE AREA(ACRES) =     18.60   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       18.6       PEAK FLOW RATE(CFS) =      38.96

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   15.58
 RAINFALL INTENSITY(INCH/HR) =   2.54
 AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      18.60
 TOTAL STREAM AREA(ACRES) =      18.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      38.96

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
```

EXISTING CONDITION, DRAINAGE AREA "B"
25-YEAR STORM, HIGH CONFIDENCE

```
 ELEVATION DATA: UPSTREAM(FEET) =   1242.00  DOWNSTREAM(FEET) =   1216.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.292
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.042
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.70      0.30      1.000    66   11.29
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.73
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.73

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1216.20  DOWNSTREAM(FEET) =   1188.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   460.00   CHANNEL SLOPE =  0.0613
 CHANNEL FLOW THRU SUBAREA(CFS) =      1.73
 FLOW VELOCITY(FEET/SEC) =   4.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.85   Tc(MIN.) =   13.15
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.15
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.791
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.60      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.80      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.40      SUBAREA RUNOFF(CFS) =     5.45
 EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       7.02

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1188.00  DOWNSTREAM(FEET) =   1107.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.1419
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      7.02
 FLOW VELOCITY(FEET/SEC) =   7.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.30   Tc(MIN.) =   14.45
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1325.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.45
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.646
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        4.80      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.20      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.00      SUBAREA RUNOFF(CFS) =    14.98
 EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       10.1       PEAK FLOW RATE(CFS) =      21.59

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1107.80  DOWNSTREAM(FEET) =   1082.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE =  0.0956
 CHANNEL FLOW THRU SUBAREA(CFS) =     21.59
 FLOW VELOCITY(FEET/SEC) =   9.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =   14.92
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.92
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.598
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        5.70      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.30      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     6.60      SUBAREA RUNOFF(CFS) =    13.70
 EFFECTIVE AREA(ACRES) =     16.70   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       16.7       PEAK FLOW RATE(CFS) =      34.86
```

EXISTING CONDITION, DRAINAGE AREA "B"
25-YEAR STORM, HIGH CONFIDENCE

```
****************************************************************************
 FLOW PROCESS FROM NODE      12.00 TO NODE      13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1082.00  DOWNSTREAM(FEET) =  1062.00
 FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.64
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      34.86
 PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   15.23
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      13.00 =    1919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      13.00 TO NODE       7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   870.00   CHANNEL SLOPE =  0.0607
 CHANNEL FLOW THRU SUBAREA(CFS) =      34.86
 FLOW VELOCITY(FEET/SEC) =   8.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =   16.91
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE       7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       7.00 TO NODE       7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.91
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.420
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C       10.30      0.25      1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.10      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.40      SUBAREA RUNOFF(CFS) =   24.31
 EFFECTIVE AREA(ACRES) =     29.10   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       29.1       PEAK FLOW RATE(CFS) =      56.50

****************************************************************************
 FLOW PROCESS FROM NODE       7.00 TO NODE       7.00 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.) =   16.91
 RAINFALL INTENSITY(INCH/HR) =   2.42
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      29.10
 TOTAL STREAM AREA(ACRES) =      29.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      56.50

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       38.96   15.58    2.535  0.21( 0.21) 1.00      18.6        1.00
     2       56.50   16.91    2.420  0.26( 0.26) 1.00      29.1        8.00

 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       93.77   15.58    2.535  0.24( 0.24) 1.00      45.4        1.00
     2       93.52   16.91    2.420  0.24( 0.24) 1.00      47.7        8.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      93.77    Tc(MIN.) =    15.58
 EFFECTIVE AREA(ACRES) =      45.40   AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       47.7
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE       7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       7.00 TO NODE      14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1012.00  DOWNSTREAM(FEET) =    954.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.3222
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      93.77
 FLOW VELOCITY(FEET/SEC.) =  32.56   FLOW DEPTH(FEET) =   0.52
 TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =   15.67
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      14.00 =    2969.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      14.00 TO NODE      82.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    954.00  DOWNSTREAM(FEET) =    917.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0663
 CHANNEL FLOW THRU SUBAREA(CFS) =      93.77
 FLOW VELOCITY(FEET/SEC) =  11.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.78   Tc(MIN.) =   16.44
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      82.00 =    3527.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      82.00 TO NODE      82.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
  MAINLINE Tc(MIN.) =   16.44
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.459
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                 C        0.10      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                 D       29.30      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   29.40      SUBAREA RUNOFF(CFS) =   59.76
  EFFECTIVE AREA(ACRES) =     74.80   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       77.1       PEAK FLOW RATE(CFS) =     150.41
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       77.1  TC(MIN.) =     16.44
  EFFECTIVE AREA(ACRES) =     74.80  AREA-AVERAGED Fm(INCH/HR)=  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =     150.41

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      150.41   16.44    2.459  0.22( 0.22) 1.00       74.8        1.00
      2      147.57   17.78    2.352  0.23( 0.23) 1.00       77.1        8.00
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "C", 25-YEAR STORM HIGH CONFIDENCE    *
* PORTOLLA TRACTS 15353 & 17300                                          *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XC-25YR.DAT
  TIME/DATE OF STUDY: 14:22 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1128.00  DOWNSTREAM(FEET) =   1050.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.448
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    77    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.20      0.20      1.000    83    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.74
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.74

**************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   295.00   CHANNEL SLOPE =  0.1695
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.74
  FLOW VELOCITY(FEET/SEC) =   5.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =    9.98
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    115.00 =     595.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    9.98
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.262
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        1.40      0.25      1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.60      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.00     SUBAREA RUNOFF(CFS) =     8.20
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.6       PEAK FLOW RATE(CFS) =       9.84

**************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    870.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1055.00   CHANNEL SLOPE =  0.1232
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.84
  FLOW VELOCITY(FEET/SEC) =   7.87 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =   12.21
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    116.00 =    1650.00 FEET.
```

EXISTING CONDITION, DRAINAGE AREA "C"
25-YEAR STORM, HIGH CONFIDENCE

```
****************************************************************************
  FLOW PROCESS FROM NODE     116.00 TO NODE     116.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.21
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.910
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D       13.20      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.60      SUBAREA RUNOFF(CFS) =   33.15
  EFFECTIVE AREA(ACRES) =     17.20   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       17.2       PEAK FLOW RATE(CFS) =      41.85
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       17.2  TC(MIN.) =     12.21
  EFFECTIVE AREA(ACRES) =     17.20  AREA-AVERAGED Fm(INCH/HR)=  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      41.85
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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                        Analysis prepared by:

                        HUNSAKER & ASSOCIATES
                              Irvine,Inc
                    Planning * Engineering * Surveying
            Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "D", 25-YEAR STORM HIGH CONFIDENCE    *
* PORTOLLA TRACTS 15353 & 17300                                          *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XD-25YR.DAT
  TIME/DATE OF STUDY: 09:32 01/23/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1030.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.611
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.546
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.90      0.25      1.000    77    8.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.67
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      2.67

**************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1030.00  DOWNSTREAM(FEET) =    990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.1619
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.67
  FLOW VELOCITY(FEET/SEC) =   5.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.71   Tc(MIN.) =    9.32
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     547.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    9.32
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.390
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        2.30      0.25      1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.30      SUBAREA RUNOFF(CFS) =     6.50
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.2       PEAK FLOW RATE(CFS) =       9.04

**************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.10 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.1250
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.04
  FLOW VELOCITY(FEET/SEC) =   7.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.69   Tc(MIN.) =   10.01
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.10 =     867.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    202.10 TO NODE    202.10 IS CODE =  81
--------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.01
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.256
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        2.20      0.25      1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.40      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     7.05
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      15.71

********************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1057.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.171
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.422
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.70      0.25      1.000    77    9.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.00
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      2.00

********************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1057.00  DOWNSTREAM(FEET) =   1026.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE =  0.2441
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.00
  FLOW VELOCITY(FEET/SEC) =   5.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.39   Tc(MIN.) =    9.56
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.10 =     427.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.10 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    9.56
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.342
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =     1.11
  EFFECTIVE AREA(ACRES) =      1.10   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =      3.06

********************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.20 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1026.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   389.00   CHANNEL SLOPE =  0.1954
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.06
  FLOW VELOCITY(FEET/SEC) =   5.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =   10.65
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.20 =     816.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    204.20 TO NODE    204.20 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.65
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.145
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.40      0.30      1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.60      0.25      1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.00      SUBAREA RUNOFF(CFS) =     5.15
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =      8.01

********************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1118.00  DOWNSTREAM(FEET) =   1062.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.321
```

EXISTING CONDITION, DRAINAGE AREA "D"
25-YEAR STORM, HIGH CONFIDENCE

```
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.80      0.25      1.000    77    9.67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =       2.21
 TOTAL AREA(ACRES) =       0.80   PEAK FLOW RATE(CFS) =       2.21

****************************************************************************
 FLOW PROCESS FROM NODE     206.00 TO NODE     206.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1027.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.3182
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.21
 FLOW VELOCITY(FEET/SEC) =   5.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.33   Tc(MIN.) =   10.00
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    206.10 =     410.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     206.10 TO NODE     206.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.258
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.50      0.25      1.000    77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =     1.35
 EFFECTIVE AREA(ACRES) =      1.30    AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =        3.52

****************************************************************************
 FLOW PROCESS FROM NODE     206.10 TO NODE     207.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1027.00  DOWNSTREAM(FEET) =    930.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   423.00   CHANNEL SLOPE =  0.2293
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.52
 FLOW VELOCITY(FEET/SEC) =   6.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.15   Tc(MIN.) =   11.15
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =     833.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     207.00 TO NODE     207.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.15
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.064
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.30      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000    77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.90      SUBAREA RUNOFF(CFS) =     4.75
 EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =        8.05

****************************************************************************
 FLOW PROCESS FROM NODE     200.10 TO NODE     200.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1134.00  DOWNSTREAM(FEET) =   1073.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.506
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.353
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        1.10      0.25      1.000    77    9.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =       3.07
 TOTAL AREA(ACRES) =       1.10   PEAK FLOW RATE(CFS) =       3.07

****************************************************************************
 FLOW PROCESS FROM NODE     200.20 TO NODE     200.30 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1073.00  DOWNSTREAM(FEET) =    990.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.1137
 CHANNEL BASE(FEET) =     2.00   "Z" FACTOR =    1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    1.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.162
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.70      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        1.80      0.25      1.000    77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.33
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.71
 AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   1.04
 Tc(MIN.) =   10.55
 SUBAREA AREA(ACRES) =     2.50       SUBAREA RUNOFF(CFS) =    6.52
 EFFECTIVE AREA(ACRES) =      3.60     AREA-AVERAGED Fm(INCH/HR) =   0.26
 AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        3.6         PEAK FLOW RATE(CFS) =       9.40

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =  13.23
 LONGEST FLOWPATH FROM NODE    200.10 TO NODE    200.30 =    1030.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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) =   3.16
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       3.60
 TOTAL STREAM AREA(ACRES) =       3.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.40

****************************************************************************
 FLOW PROCESS FROM NODE    200.31 TO NODE    200.32 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1238.00  DOWNSTREAM(FEET) =   1204.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.138
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        0.40      0.20     1.000    83   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.06
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.06

****************************************************************************
 FLOW PROCESS FROM NODE    200.32 TO NODE    200.33 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1204.00  DOWNSTREAM(FEET) =   1150.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE =  0.3253
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.06
 FLOW VELOCITY(FEET/SEC) =   3.25 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.85   Tc(MIN.) =   11.54
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.33 =     466.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.33 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.54
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.005
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        0.20      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        0.30      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =    1.24
 EFFECTIVE AREA(ACRES) =      0.90    AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       2.25

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.34 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =   1100.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   159.00   CHANNEL SLOPE =  0.3145
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.25
 FLOW VELOCITY(FEET/SEC) =   5.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.47   Tc(MIN.) =   12.01
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.34 =     625.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.34 TO NODE    200.34 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.01
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.937
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        0.80      0.30     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        0.90      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =    4.12
 EFFECTIVE AREA(ACRES) =      2.60    AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       6.32
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     200.34 TO NODE      82.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    1100.00  DOWNSTREAM(FEET) =    1085.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0791
  CHANNEL FLOW THRU SUBAREA(CFS) =        6.32
  FLOW VELOCITY(FEET/SEC) =    6.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =    0.50   Tc(MIN.) =    12.51
  LONGEST FLOWPATH FROM NODE     200.31 TO NODE      82.10 =      812.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      82.10 TO NODE      82.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    12.51
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.871
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        2.00      0.30      1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.10      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     3.50     SUBAREA RUNOFF(CFS) =     8.22
  EFFECTIVE AREA(ACRES) =      6.10   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =         6.1       PEAK FLOW RATE(CFS) =      14.38

****************************************************************************
  FLOW PROCESS FROM NODE      82.10 TO NODE     200.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1085.20  DOWNSTREAM(FEET) =    990.00
  FLOW LENGTH(FEET) =    392.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS    6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.13
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =    1
  PIPE-FLOW(CFS) =      14.38
  PIPE TRAVEL TIME(MIN.) =    0.27    Tc(MIN.) =    12.78
  LONGEST FLOWPATH FROM NODE     200.31 TO NODE     200.30 =     1204.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     200.30 TO NODE     200.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.78
  RAINFALL INTENSITY(INCH/HR) =   2.84
  AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.10
  TOTAL STREAM AREA(ACRES) =       6.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.38

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1        9.40   10.55     3.162  0.26( 0.26) 1.00        3.6      200.10
      2       14.38   12.78     2.836  0.25( 0.25) 1.00        6.1      200.31

  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       22.76   10.55     3.162  0.26( 0.26) 1.00        8.6      200.10
      2       22.72   12.78     2.836  0.26( 0.26) 1.00        9.7      200.31

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      22.76    Tc(MIN.) =    10.55
  EFFECTIVE AREA(ACRES) =       8.63   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.7
  LONGEST FLOWPATH FROM NODE     200.31 TO NODE     200.30 =     1204.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     200.30 TO NODE     200.40 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     990.00  DOWNSTREAM(FEET) =     970.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1250
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       22.76
  FLOW VELOCITY(FEET/SEC) =    9.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =    0.27   Tc(MIN.) =    10.82
  LONGEST FLOWPATH FROM NODE     200.31 TO NODE     200.40 =     1364.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     200.40 TO NODE     200.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    10.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.117
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.90      0.30      1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.20      0.25      1.000    77
  NATURAL FAIR COVER
```

```
  "OPEN BRUSH"                D        0.50      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     4.11
  EFFECTIVE AREA(ACRES) =     10.23   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        11.3       PEAK FLOW RATE(CFS) =      26.34

****************************************************************************
  FLOW PROCESS FROM NODE    200.40 TO NODE    200.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     970.00  DOWNSTREAM(FEET) =     949.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   156.00   CHANNEL SLOPE =  0.1346
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      26.34
  FLOW VELOCITY(FEET/SEC) =  10.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.25   Tc(MIN.) =   11.07
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.50 =    1520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.50 TO NODE    200.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.076
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.60      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.30      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.20      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.10      SUBAREA RUNOFF(CFS) =     5.37
  EFFECTIVE AREA(ACRES) =     12.33   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        13.4       PEAK FLOW RATE(CFS) =      31.34
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       13.4  TC(MIN.) =     11.07
  EFFECTIVE AREA(ACRES) =     12.33  AREA-AVERAGED Fm(INCH/HR)=  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      31.34

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       31.34   11.07    3.076  0.25( 0.25) 1.00       12.3      200.10
      2       30.38   13.31    2.772  0.25( 0.25) 1.00       13.4      200.31
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "D"
25-YEAR STORM, HIGH CONFIDENCE

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, AREAS "E" & "F", 25-YEAR STORM HIGH CONFIDENCE      *
* PORTOLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                           *
 **************************************************************************

  FILE NAME: X-EF-25.DAT
  TIME/DATE OF STUDY: 18:22 01/23/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)      (FT)   SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   45.0      40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE     400.00 TO NODE     400.10 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1078.00  DOWNSTREAM(FEET) =   1072.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.509
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.155
  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                 B        0.50      0.30      0.850    56   10.34
  COMMERCIAL                  B        0.20      0.30      0.100    56    6.51
  COMMERCIAL                  C        0.20      0.25      0.100    69    6.51
  PUBLIC PARK                 C        0.10      0.25      0.850    69   10.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.550
  SUBAREA RUNOFF(CFS) =      3.60
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.60

**************************************************************************
  FLOW PROCESS FROM NODE     400.10 TO NODE     401.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) = 1072.00  DOWNSTREAM ELEVATION(FEET) = 1058.00
  STREET LENGTH(FEET) =   321.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.52
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.78
  STREET FLOW TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =    7.60
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.806
  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        0.40      0.30      0.850    56
  PUBLIC PARK                 C        1.10      0.25      0.850    69
  COMMERCIAL                  C        0.30      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    5.86
  EFFECTIVE AREA(ACRES) =      2.80    AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =       2.8        PEAK FLOW RATE(CFS) =       9.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.16
  FLOW VELOCITY(FEET/SEC.) =  5.25   DEPTH*VELOCITY(FT*FT/SEC.) =   2.09
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    401.00 =     621.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     401.00 TO NODE     402.00 IS CODE =  62
--------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1058.00  DOWNSTREAM ELEVATION(FEET) =  990.00
  STREET LENGTH(FEET) =   803.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   13.87
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.53
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.09
  STREET FLOW TRAVEL TIME(MIN.) =   1.78   Tc(MIN.) =    9.38
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.379
  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"        B        0.60      0.30      0.500    56
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.20      0.25      0.500    69
  PUBLIC PARK                 D        2.20      0.20      0.850    75
  COMMERCIAL                  D        0.60      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.647
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =   10.50
  EFFECTIVE AREA(ACRES) =      6.40    AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =        6.4        PEAK FLOW RATE(CFS) =      18.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.43
  FLOW VELOCITY(FEET/SEC.) =  8.00   DEPTH*VELOCITY(FT*FT/SEC.) =   3.50
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =    1424.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.38
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.379
  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        0.30      0.30      0.850    56
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.20      0.30      1.000    66
  PUBLIC PARK                 D        0.60      0.20      0.850    75
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        7.10      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
  SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =   23.44
  EFFECTIVE AREA(ACRES) =     14.60   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      42.00

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    500.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    948.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.815
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.293
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.30      0.20      1.000    83    9.81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.62
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.62

****************************************************************************
  FLOW PROCESS FROM NODE    500.10 TO NODE    501.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    948.00  DOWNSTREAM(FEET) =    920.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.1000
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.62
  FLOW VELOCITY(FEET/SEC) =   6.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.75   Tc(MIN.) =   10.57
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    501.00 =     580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.57
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.158
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.10      0.30      1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.70      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    4.69
```

```
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       8.15
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        3.1  TC(MIN.) =     10.57
  EFFECTIVE AREA(ACRES) =      3.10  AREA-AVERAGED Fm(INCH/HR)=  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       8.15
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
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            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************** DESCRIPTION OF STUDY **************************
* EXISTING HYDROLOGY, DRAINAGE AREA "A", 50-YEAR STORM HIGH CONFIDENCE     *
* PORTOLA TRACTS 15353 & 17300                                            *
* W.O. #3751-1                                                            *
 ************************************************************************

  FILE NAME: XA-50YR.DAT
  TIME/DATE OF STUDY: 17:43 12/28/2012
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   50.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   45.0     40.0    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

 ************************************************************************
  FLOW PROCESS FROM NODE     300.00 TO NODE     301.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1132.30  DOWNSTREAM(FEET) =   1088.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.148
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.642
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        2.00      0.20      1.000    83   10.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      6.20
  TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      6.20

 ************************************************************************
  FLOW PROCESS FROM NODE     301.00 TO NODE     302.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1088.30  DOWNSTREAM(FEET) =   1077.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0286
  CHANNEL FLOW THRU SUBAREA(CFS) =      6.20
  FLOW VELOCITY(FEET/SEC) =   3.76 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.72   Tc(MIN.) =   11.87
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     688.00 FEET.

 ************************************************************************
  FLOW PROCESS FROM NODE     302.00 TO NODE     302.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.87
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.333
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        4.60      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     4.60      SUBAREA RUNOFF(CFS) =   12.97
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       6.6       PEAK FLOW RATE(CFS) =      18.61

 ************************************************************************
  FLOW PROCESS FROM NODE     302.00 TO NODE     303.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1077.20  DOWNSTREAM(FEET) =  1073.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.61
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.02
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

 ************************************************************************
  FLOW PROCESS FROM NODE     303.00 TO NODE     303.00 IS CODE =   1
------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.02
  RAINFALL INTENSITY(INCH/HR) =   3.31
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.60
  TOTAL STREAM AREA(ACRES) =       6.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      18.61

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   14.35   RAINFALL INTENSITY(INCH/HR) =  2.99
  EFFECTIVE AREA(ACRES) =   111.70
  TOTAL AREA(ACRES) =   151.43        PEAK FLOW RATE(CFS) =    346.43
  AREA-AVERAGED Fm(INCH/HR) =   0.10  AREA-AVERAGED Fp(INCH/HR) =   0.20
  AREA-AVERAGED Ap =  0.50
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   14.35
  RAINFALL INTENSITY(INCH/HR) =   2.99
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =     111.70
  TOTAL STREAM AREA(ACRES) =     151.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     346.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       18.61   12.02    3.309  0.20( 0.20) 1.00       6.6     300.00
      2      346.43   14.35    2.994  0.20( 0.10) 0.50     111.7     303.00

  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      340.48   12.02    3.309  0.20( 0.11) 0.53     100.2     300.00
      2      363.15   14.35    2.994  0.20( 0.11) 0.53     118.3     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     363.15    Tc(MIN.) =    14.35
  EFFECTIVE AREA(ACRES) =     118.30   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =      158.0
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.00  DOWNSTREAM(FEET) =  1056.00
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  38.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.60
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     363.15
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   14.46
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =    1031.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.46
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  2.980
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.30      0.20      0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     0.80
  EFFECTIVE AREA(ACRES) =    118.60   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =      158.3       PEAK FLOW RATE(CFS) =     363.15
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1056.00  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  43.80
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     363.15
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   14.48
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    307.00 =    1071.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
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 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   14.48
 RAINFALL INTENSITY(INCH/HR) =   2.98
 AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.53
 EFFECTIVE STREAM AREA(ACRES) =     118.60
 TOTAL STREAM AREA(ACRES) =     158.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     363.15

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1103.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.756
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.960
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        0.80      0.20      1.000     83    8.76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.71
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.71

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1103.00  DOWNSTREAM(FEET) =   1067.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   644.00   CHANNEL SLOPE =  0.0548
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.676
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        3.40      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.03
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.74
 AVERAGE FLOW DEPTH(FEET) =   0.27   TRAVEL TIME(MIN.) =   1.23
 Tc(MIN.) =    9.98
 SUBAREA AREA(ACRES) =     3.40       SUBAREA RUNOFF(CFS) =   10.64
 EFFECTIVE AREA(ACRES) =      4.20     AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        4.2         PEAK FLOW RATE(CFS) =      13.14

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =  10.26
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =     944.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1067.70  DOWNSTREAM(FEET) =   1052.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0177
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.339
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        4.70      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.78
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.98
 AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   1.85
 Tc(MIN.) =   11.84
 SUBAREA AREA(ACRES) =     4.70       SUBAREA RUNOFF(CFS) =   13.28
 EFFECTIVE AREA(ACRES) =      8.90     AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        8.9         PEAK FLOW RATE(CFS) =      25.14

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.72   FLOW VELOCITY(FEET/SEC.) =   8.56
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    311.00 =    1831.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.84
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.339
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        0.70      0.30      1.000     66
 NATURAL FAIR COVER
 "OPEN BRUSH"               D       11.50      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    12.20       SUBAREA RUNOFF(CFS) =   34.40
 EFFECTIVE AREA(ACRES) =     21.10    AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       21.1        PEAK FLOW RATE(CFS) =      59.54

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
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  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1051.10  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  29.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.65
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.54
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   12.05
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   12.05
  RAINFALL INTENSITY(INCH/HR) =   3.31
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      21.10
  TOTAL STREAM AREA(ACRES) =      21.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      59.54

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      340.48   12.15    3.289  0.20( 0.11) 0.53     100.5     300.00
      1      363.15   14.48    2.979  0.20( 0.11) 0.53     118.6     303.00
      2       59.54   12.05    3.305  0.20( 0.20) 1.00      21.1     308.00

  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      398.81   12.05    3.305  0.20( 0.12) 0.61     120.7     308.00
      2      399.72   12.15    3.289  0.20( 0.12) 0.61     121.6     300.00
      3      416.43   14.48    2.979  0.20( 0.12) 0.60     139.7     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     416.43    Tc(MIN.) =    14.48
  EFFECTIVE AREA(ACRES) =     139.70   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =      179.4
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1050.00  DOWNSTREAM(FEET) =  1025.50
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  32.86
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     416.43
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   14.68
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.68
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.80      0.20      0.100    75
  SCHOOL                     D        2.40      0.20      0.600    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     3.20      SUBAREA RUNOFF(CFS) =     8.24
  EFFECTIVE AREA(ACRES) =    142.90   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =      182.6      PEAK FLOW RATE(CFS) =      416.43
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   14.68
  RAINFALL INTENSITY(INCH/HR) =   2.96
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =     142.90
  TOTAL STREAM AREA(ACRES) =     182.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     416.43

****************************************************************************
  FLOW PROCESS FROM NODE    333.10 TO NODE    333.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1144.00  DOWNSTREAM(FEET) =   1094.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.892
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.696
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        1.00      0.20      1.000    83    9.89
```

EXISTING CONDITION, DRAINAGE AREA "A"
50-YEAR STORM, HIGH CONFIDENCE

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.15
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.15

****************************************************************************
  FLOW PROCESS FROM NODE    333.11 TO NODE    333.20 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1094.00  DOWNSTREAM(FEET) =   1075.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   275.00   CHANNEL SLOPE =  0.0684
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.15
  FLOW VELOCITY(FEET/SEC) =   4.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.92   Tc(MIN.) =   10.82
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.20 =     575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.20 TO NODE    333.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.82
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        5.50      0.20      1.000     83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =    16.40
  EFFECTIVE AREA(ACRES) =      6.50   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.5       PEAK FLOW RATE(CFS) =      19.38

****************************************************************************
  FLOW PROCESS FROM NODE    333.20 TO NODE    333.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1075.20  DOWNSTREAM(FEET) =   1032.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   135.00   CHANNEL SLOPE =  0.3200
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      19.38
  FLOW VELOCITY(FEET/SEC.) =  25.46   FLOW DEPTH(FEET) =   0.87
  TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =   10.90
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.30 =     710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.30 TO NODE    333.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1032.00  DOWNSTREAM ELEVATION(FEET) = 1027.00
  STREET LENGTH(FEET) =   123.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.50
    HALFSTREET FLOOD WIDTH(FEET) =  18.95
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.23
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.12
  STREET FLOW TRAVEL TIME(MIN.) =   0.33   Tc(MIN.) =   11.23
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.439
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.60      0.20      0.100     75
  PUBLIC PARK                 D        0.60      0.20      0.850     75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     3.61
  EFFECTIVE AREA(ACRES) =      7.70   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =      22.56

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  19.41
  FLOW VELOCITY(FEET/SEC.) =  6.34   DEPTH*VELOCITY(FT*FT/SEC.) =   3.23
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.00 =     833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   11.23
  RAINFALL INTENSITY(INCH/HR) =   3.44
  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.92
  EFFECTIVE STREAM AREA(ACRES) =       7.70
  TOTAL STREAM AREA(ACRES) =       7.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      22.56

  ** CONFLUENCE DATA **
   STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      398.81   12.25     3.274  0.20( 0.12) 0.61     123.9      308.00
      1      399.72   12.36     3.258  0.20( 0.12) 0.61     124.8      300.00
      1      416.43   14.68     2.955  0.20( 0.12) 0.60     142.9      303.00
      2       22.56   11.23     3.439  0.20( 0.18) 0.92       7.7      333.10
```

```
 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      407.34   11.23    3.439  0.20( 0.13) 0.63      121.3     333.10
     2      420.23   12.25    3.274  0.20( 0.13) 0.63      131.6     308.00
     3      421.03   12.36    3.258  0.20( 0.13) 0.63      132.5     300.00
     4      435.63   14.68    2.955  0.20( 0.12) 0.61      150.6     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      435.63    Tc(MIN.) =    14.68
 EFFECTIVE AREA(ACRES) =     150.60   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.61
 TOTAL AREA(ACRES) =      190.3
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1025.50  DOWNSTREAM(FEET) =  1024.00
 FLOW LENGTH(FEET) =   109.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  54.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.92
 ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     435.63
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   14.78
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   14.78
 RAINFALL INTENSITY(INCH/HR) =   2.94
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.61
 EFFECTIVE STREAM AREA(ACRES) =     150.60
 TOTAL STREAM AREA(ACRES) =     190.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     435.63

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    335.11 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   243.00
 ELEVATION DATA: UPSTREAM(FEET) =   1077.80  DOWNSTREAM(FEET) =   1075.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.680
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  4.615
 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        0.20      0.25      0.100    69    6.68
 PUBLIC PARK                C        0.20      0.25      0.850    69   10.61
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA RUNOFF(CFS) =      1.62
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.62

****************************************************************************
 FLOW PROCESS FROM NODE    335.11 TO NODE    335.10 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1075.00  DOWNSTREAM ELEVATION(FEET) = 1070.00
 STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.02
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.35
   HALFSTREET FLOOD WIDTH(FEET) =   10.51
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.41
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.19
 STREET FLOW TRAVEL TIME(MIN.) =   1.05   Tc(MIN.) =    7.73
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  4.249
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.20      0.20      0.100    75
 PUBLIC PARK                D        1.10      0.20      0.850    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.735
 SUBAREA AREA(ACRES) =     1.30      SUBAREA RUNOFF(CFS) =     4.80
 EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       6.29

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  12.85
 FLOW VELOCITY(FEET/SEC.) =  3.77   DEPTH*VELOCITY(FT*FT/SEC.) =   1.48
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.10 =     458.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.10 TO NODE    335.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1070.00  DOWNSTREAM ELEVATION(FEET) = 1048.00
  STREET LENGTH(FEET) =   588.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.87
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.41
    HALFSTREET FLOOD WIDTH(FEET) =   14.02
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.06
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.09
  STREET FLOW TRAVEL TIME(MIN.) =   1.94   Tc(MIN.) =    9.67
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.744
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.60      0.20      0.100    75
  PUBLIC PARK                 D        1.60      0.20      0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
  SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    7.16
  EFFECTIVE AREA(ACRES) =      3.90    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =      12.67

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.59
  FLOW VELOCITY(FEET/SEC.) =  5.36   DEPTH*VELOCITY(FT*FT/SEC.) =   2.36
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.20 =    1046.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.20 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1048.00  DOWNSTREAM(FEET) =  1024.00
  FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.91
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.67
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =   10.30
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    336.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.30
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.612
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.30      0.25      0.100    69
  PUBLIC PARK                 C        0.10      0.25      0.850    69
  COMMERCIAL                  D        1.50      0.20      0.100    75
  PUBLIC PARK                 D        1.50      0.20      0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.453
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =   10.77
  EFFECTIVE AREA(ACRES) =      7.30   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =        7.3        PEAK FLOW RATE(CFS) =      22.98

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   10.30
  RAINFALL INTENSITY(INCH/HR) =   3.61
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =       7.30
  TOTAL STREAM AREA(ACRES) =       7.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      22.98

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      407.34   11.33    3.422  0.20( 0.13) 0.63     121.3     333.10
      1      420.23   12.35    3.259  0.20( 0.13) 0.63     131.6     308.00
      1      421.03   12.45    3.244  0.20( 0.13) 0.63     132.5     300.00
      1      435.63   14.78    2.944  0.20( 0.12) 0.61     150.6     303.00
      2       22.98   10.30    3.612  0.20( 0.11) 0.56       7.3     335.00

  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      414.59   10.30    3.612  0.20( 0.13) 0.63     117.6     335.00
      2      429.07   11.33    3.422  0.20( 0.13) 0.63     128.6     333.10
      3      440.89   12.35    3.259  0.20( 0.13) 0.62     138.9     308.00
      4      441.59   12.45    3.244  0.20( 0.13) 0.62     139.8     300.00
      5      454.23   14.78    2.944  0.20( 0.12) 0.61     157.9     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     454.23    Tc(MIN.) =    14.78
  EFFECTIVE AREA(ACRES) =     157.90   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.61
  TOTAL AREA(ACRES) =      197.6
```

```
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1024.00  DOWNSTREAM(FEET) =   895.30
 FLOW LENGTH(FEET) =   549.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  54.75
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     454.23
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   14.95
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   14.95
 RAINFALL INTENSITY(INCH/HR) =   2.93
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.61
 EFFECTIVE STREAM AREA(ACRES) =     157.90
 TOTAL STREAM AREA(ACRES) =     197.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     454.23

****************************************************************************
 FLOW PROCESS FROM NODE    373.00 TO NODE    373.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =   1018.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.657
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.368
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.20      0.20      1.000    83   11.66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.42
 TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      3.42

****************************************************************************
 FLOW PROCESS FROM NODE    373.10 TO NODE    374.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1018.00  DOWNSTREAM(FEET) =    895.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.3098
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.312
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.80      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.94
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  18.83
 AVERAGE FLOW DEPTH(FEET) =   0.56   TRAVEL TIME(MIN.) =   0.35
 Tc(MIN.) =   12.01
 SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =     5.04
 EFFECTIVE AREA(ACRES) =     3.00     AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      3.0         PEAK FLOW RATE(CFS) =       8.40

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.64   FLOW VELOCITY(FEET/SEC.) =  20.64
 LONGEST FLOWPATH FROM NODE    373.00 TO NODE    374.00 =     696.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.01
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.312
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        7.30      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.30       SUBAREA RUNOFF(CFS) =    20.44
 EFFECTIVE AREA(ACRES) =     10.30    AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       10.3        PEAK FLOW RATE(CFS) =      28.84

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   12.01
 RAINFALL INTENSITY(INCH/HR) =   3.31
 AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      10.30
 TOTAL STREAM AREA(ACRES) =      10.30
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.84

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      414.59   10.47    3.579  0.20( 0.13) 0.63      117.6      335.00
     1      429.07   11.50    3.394  0.20( 0.13) 0.63      128.6      333.10
     1      440.89   12.52    3.234  0.20( 0.13) 0.62      138.9      308.00
     1      441.59   12.62    3.220  0.20( 0.13) 0.62      139.8      300.00
     1      454.23   14.95    2.926  0.20( 0.12) 0.61      157.9      303.00
     2       28.84   12.01    3.312  0.20( 0.20) 1.00       10.3      373.00

 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      441.89   10.47    3.579  0.20( 0.13) 0.65      126.6      335.00
     2      457.42   11.50    3.394  0.20( 0.13) 0.65      138.5      333.10
     3      463.81   12.01    3.312  0.20( 0.13) 0.65      144.1      373.00
     4      469.02   12.52    3.234  0.20( 0.13) 0.65      149.2      308.00
     5      469.58   12.62    3.220  0.20( 0.13) 0.65      150.1      300.00
     6      479.49   14.95    2.926  0.20( 0.13) 0.63      168.2      303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     479.49    Tc(MIN.) =    14.95
 EFFECTIVE AREA(ACRES) =     168.20   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.63
 TOTAL AREA(ACRES) =      207.9
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    377.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   895.30  DOWNSTREAM(FEET) =   890.00
 FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  49.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.15
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     479.49
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   15.05
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   15.05
 RAINFALL INTENSITY(INCH/HR) =   2.91
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.63
 EFFECTIVE STREAM AREA(ACRES) =     168.20
 TOTAL STREAM AREA(ACRES) =     207.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     479.49

****************************************************************************
 FLOW PROCESS FROM NODE    375.00 TO NODE    376.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1140.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.544
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  4.015
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                 D       1.30      0.20      1.000     83    8.54
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      4.46
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      4.46

****************************************************************************
 FLOW PROCESS FROM NODE    376.00 TO NODE    377.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1036.00  DOWNSTREAM(FEET) =    882.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.2034
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       4.46
 FLOW VELOCITY(FEET/SEC) =   6.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.94   Tc(MIN.) =   10.49
 LONGEST FLOWPATH FROM NODE    375.00 TO NODE    377.00 =    1057.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.49
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.576
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                 D       4.70      0.20      1.000     83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =   14.28
 EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        6.0       PEAK FLOW RATE(CFS) =      18.23

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   10.49
  RAINFALL INTENSITY(INCH/HR) =   3.58
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.00
  TOTAL STREAM AREA(ACRES) =       6.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      18.23

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR)  (INCH/HR)           (ACRES)    NODE
      1      441.89    10.58     3.558  0.20( 0.13) 0.65      126.6     335.00
      1      457.42    11.61     3.376  0.20( 0.13) 0.65      138.5     333.10
      1      463.81    12.12     3.295  0.20( 0.13) 0.65      144.1     373.00
      1      469.02    12.63     3.219  0.20( 0.13) 0.65      149.2     308.00
      1      469.58    12.73     3.204  0.20( 0.13) 0.65      150.1     300.00
      1      479.49    15.05     2.914  0.20( 0.13) 0.63      168.2     303.00
      2       18.23    10.49     3.576  0.20( 0.20) 1.00        6.0     375.00

  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      458.53    10.49     3.576  0.20( 0.13) 0.67      131.5     375.00
      2      460.03    10.58     3.558  0.20( 0.13) 0.67      132.6     335.00
      3      474.57    11.61     3.376  0.20( 0.13) 0.67      144.5     333.10
      4      480.52    12.12     3.295  0.20( 0.13) 0.67      150.1     373.00
      5      485.32    12.63     3.219  0.20( 0.13) 0.66      155.2     308.00
      6      485.80    12.73     3.204  0.20( 0.13) 0.66      156.1     300.00
      7      494.15    15.05     2.914  0.20( 0.13) 0.65      174.2     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     494.15    Tc(MIN.) =    15.05
  EFFECTIVE AREA(ACRES) =     174.20   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =      213.9
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    381.00 TO NODE    382.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    992.00  DOWNSTREAM(FEET) =    914.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.886
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.20      0.25      1.000    77    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.10      0.20      1.000    83    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.30
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      4.30

****************************************************************************
  FLOW PROCESS FROM NODE    383.10 TO NODE    383.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1022.00  DOWNSTREAM(FEET) =   1008.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.730
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
  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                 D        0.50      0.20      0.850    75    8.73
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.71
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.71

****************************************************************************
  FLOW PROCESS FROM NODE    383.20 TO NODE    383.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1008.00  DOWNSTREAM(FEET) =    988.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   347.00   CHANNEL SLOPE =  0.0576
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.838
  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        2.00      0.25      0.850    69
  PUBLIC PARK                 D        2.40      0.20      0.850    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.93
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.09
  AVERAGE FLOW DEPTH(FEET) =   0.90   TRAVEL TIME(MIN.) =   0.52
  Tc(MIN.) =    9.25
  SUBAREA AREA(ACRES) =     4.40      SUBAREA RUNOFF(CFS) =   14.45
  EFFECTIVE AREA(ACRES) =     4.90     AREA-AVERAGED Fm(INCH/HR) =   0.19
  AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   0.85
  TOTAL AREA(ACRES) =      4.9        PEAK FLOW RATE(CFS) =     16.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
 DEPTH(FEET) =  1.12   FLOW VELOCITY(FEET/SEC.) =  12.87
 LONGEST FLOWPATH FROM NODE    383.10 TO NODE    383.00 =     647.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    384.10 TO NODE    384.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.538
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25     1.000    77   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.78
 TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.78

****************************************************************************
 FLOW PROCESS FROM NODE    385.10 TO NODE    385.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1105.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.896
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.924
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.00      0.20     1.000    83    8.90
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.35
 TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.35

****************************************************************************
 FLOW PROCESS FROM NODE    385.20 TO NODE    385.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    980.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   390.00   CHANNEL SLOPE =  0.3205
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.35
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.37   Tc(MIN.) =   10.27
 LONGEST FLOWPATH FROM NODE    385.10 TO NODE    385.00 =     690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    385.00 TO NODE    385.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.27
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.619
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.30      0.25     1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.30      0.20     1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.60      SUBAREA RUNOFF(CFS) =     7.99
 EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      3.6       PEAK FLOW RATE(CFS) =      11.06
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        3.6  TC(MIN.) =     10.27
 EFFECTIVE AREA(ACRES) =      3.60  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      11.06
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "B", 50-YEAR STORM HIGH CONFIDENCE     *
* PORTOLA TRACTS 15353 & 17300                                            *
* W.O. #3751-1                                                            *
 **************************************************************************

  FILE NAME: XB-50YR.DAT
  TIME/DATE OF STUDY: 19:30 01/03/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   50.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:    CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-   HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)      (FT)   SIDE / SIDE/ WAY     (FT)    (FT)  (FT)  (FT)     (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   30.0      20.0   0.018/0.018/0.020    0.67    2.00 0.0312 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

**************************************************************************
  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) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1207.00  DOWNSTREAM(FEET) =   1142.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.386
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.807
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.80      0.20      1.000    83    9.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.60
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.60

**************************************************************************
  FLOW PROCESS FROM NODE       2.00 TO NODE       3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1142.00  DOWNSTREAM(FEET) =   1136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE =  0.0189
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.60
  FLOW VELOCITY(FEET/SEC) =   2.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.12   Tc(MIN.) =   11.51
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     618.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   11.51
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.392
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        2.80      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.80      SUBAREA RUNOFF(CFS) =     8.04
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.6       PEAK FLOW RATE(CFS) =      10.34

**************************************************************************
  FLOW PROCESS FROM NODE       3.00 TO NODE       4.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1136.00  DOWNSTREAM(FEET) =   1124.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.0320
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.34
  FLOW VELOCITY(FEET/SEC) =   4.51 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.39   Tc(MIN.) =   12.89
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     993.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE       4.00 TO NODE       4.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
```

EXISTING CONDITION, DRAINAGE AREA "B"
50-YEAR STORM, HIGH CONFIDENCE

```
 MAINLINE Tc(MIN.) =   12.89
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.181
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.50      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        3.50      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.00      SUBAREA RUNOFF(CFS) =   13.28
 EFFECTIVE AREA(ACRES) =      8.60   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        8.6       PEAK FLOW RATE(CFS) =      22.94

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1124.00  DOWNSTREAM(FEET) =   1120.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0148
 CHANNEL FLOW THRU SUBAREA(CFS) =      22.94
 FLOW VELOCITY(FEET/SEC) =   3.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.01   Tc(MIN.) =   13.91
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1223.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.91
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.047
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.50      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.50      SUBAREA RUNOFF(CFS) =   11.53
 EFFECTIVE AREA(ACRES) =     13.10   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      33.44

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1120.60  DOWNSTREAM(FEET) =  1052.00
 FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.67
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      33.44
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   14.31
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1773.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1052.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0718
 CHANNEL FLOW THRU SUBAREA(CFS) =      33.44
 FLOW VELOCITY(FEET/SEC) =   9.25 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.07   Tc(MIN.) =   15.39
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    2369.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.39
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  2.878
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.10      0.25      1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        5.40      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =   13.25
 EFFECTIVE AREA(ACRES) =     18.60   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       18.6       PEAK FLOW RATE(CFS) =      44.69

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   15.39
 RAINFALL INTENSITY(INCH/HR) =   2.88
 AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      18.60
 TOTAL STREAM AREA(ACRES) =      18.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      44.69

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
```

EXISTING CONDITION, DRAINAGE AREA "B"
50-YEAR STORM, HIGH CONFIDENCE

```
 ELEVATION DATA: UPSTREAM(FEET) =   1242.00  DOWNSTREAM(FEET) =   1216.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.292
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.429
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.70      0.30      1.000    66   11.29
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.97
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      1.97

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1216.20  DOWNSTREAM(FEET) =   1188.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   460.00   CHANNEL SLOPE =  0.0613
 CHANNEL FLOW THRU SUBAREA(CFS) =      1.97
 FLOW VELOCITY(FEET/SEC) =   4.25 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.80   Tc(MIN.) =   13.10
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.10
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.153
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.60      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.80      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.40     SUBAREA RUNOFF(CFS) =     6.23
 EFFECTIVE AREA(ACRES) =     3.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      3.1      PEAK FLOW RATE(CFS) =      8.03

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1188.00  DOWNSTREAM(FEET) =   1107.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.1419
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      8.03
 FLOW VELOCITY(FEET/SEC) =   7.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.26   Tc(MIN.) =   14.35
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1325.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.35
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  2.993
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        4.80      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.20      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.00     SUBAREA RUNOFF(CFS) =    17.17
 EFFECTIVE AREA(ACRES) =    10.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      10.1      PEAK FLOW RATE(CFS) =      24.75

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1107.80  DOWNSTREAM(FEET) =   1082.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE =  0.0956
 CHANNEL FLOW THRU SUBAREA(CFS) =     24.75
 FLOW VELOCITY(FEET/SEC) =   9.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.46   Tc(MIN.) =   14.81
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.81
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  2.940
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        5.70      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.30      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     6.60     SUBAREA RUNOFF(CFS) =    15.74
 EFFECTIVE AREA(ACRES) =    16.70   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      16.7      PEAK FLOW RATE(CFS) =      40.01
```

```
****************************************************************************
 FLOW PROCESS FROM NODE      12.00 TO NODE      13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1082.00  DOWNSTREAM(FEET) =  1062.00
 FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.63
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      40.01
 PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   15.10
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      13.00 TO NODE       7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   870.00   CHANNEL SLOPE =  0.0607
 CHANNEL FLOW THRU SUBAREA(CFS) =      40.01
 FLOW VELOCITY(FEET/SEC) =   8.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.62   Tc(MIN.) =   16.72
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE       7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       7.00 TO NODE       7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.72
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  2.745
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C       10.30      0.25      1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.10      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.40      SUBAREA RUNOFF(CFS) =   27.94
 EFFECTIVE AREA(ACRES) =     29.10   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       29.1       PEAK FLOW RATE(CFS) =      65.02

****************************************************************************
 FLOW PROCESS FROM NODE       7.00 TO NODE       7.00 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.) =   16.72
 RAINFALL INTENSITY(INCH/HR) =   2.75
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      29.10
 TOTAL STREAM AREA(ACRES) =      29.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      65.02

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       44.69   15.39    2.878  0.21( 0.21) 1.00      18.6       1.00
     2       65.02   16.72    2.745  0.26( 0.26) 1.00      29.1       8.00

 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      107.71   15.39    2.878  0.24( 0.24) 1.00      45.4       1.00
     2      107.49   16.72    2.745  0.24( 0.24) 1.00      47.7       8.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     107.71    Tc(MIN.) =    15.39
 EFFECTIVE AREA(ACRES) =      45.37   AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       47.7
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE       7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       7.00 TO NODE      14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1012.00  DOWNSTREAM(FEET) =    954.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.3222
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     107.71
 FLOW VELOCITY(FEET/SEC.) =  34.48   FLOW DEPTH(FEET) =   0.56
 TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =   15.47
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      14.00 =    2969.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      14.00 TO NODE      82.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    954.00  DOWNSTREAM(FEET) =    917.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0663
 CHANNEL FLOW THRU SUBAREA(CFS) =     107.71
 FLOW VELOCITY(FEET/SEC) =  12.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =   16.22
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      82.00 =    3527.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      82.00 TO NODE      82.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
  MAINLINE Tc(MIN.) =   16.22
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  2.794
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.10      0.25      1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D       29.30      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   29.40      SUBAREA RUNOFF(CFS) =   68.62
  EFFECTIVE AREA(ACRES) =     74.77   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       77.1       PEAK FLOW RATE(CFS) =     172.88
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       77.1  TC(MIN.) =     16.22
  EFFECTIVE AREA(ACRES) =     74.77  AREA-AVERAGED Fm(INCH/HR)=  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =     172.88

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1      172.88    16.22    2.794  0.22( 0.22) 1.00      74.8       1.00
      2      169.67    17.56    2.671  0.23( 0.23) 1.00      77.1       8.00
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
           Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "C", 50-YEAR STORM HIGH CONFIDENCE     *
* PORTOLLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                            *
 ************************************************************************

  FILE NAME: XC-50YR.DAT
  TIME/DATE OF STUDY: 14:18 01/22/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   50.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1128.00  DOWNSTREAM(FEET) =   1050.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.886
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    77    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.20      0.20      1.000    83    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.97
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      1.97

**************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   295.00   CHANNEL SLOPE =  0.1695
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.97
  FLOW VELOCITY(FEET/SEC) =   5.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.91   Tc(MIN.) =    9.96
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    115.00 =     595.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    9.96
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.682
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        1.40      0.25      1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.60      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.00      SUBAREA RUNOFF(CFS) =    9.34
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.6       PEAK FLOW RATE(CFS) =      11.20

**************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    870.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1055.00   CHANNEL SLOPE =  0.1232
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.20
  FLOW VELOCITY(FEET/SEC) =   8.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.16   Tc(MIN.) =   12.12
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    116.00 =    1650.00 FEET.
```

EXISTING CONDITION, DRAINAGE AREA "C"
50-YEAR STORM, HIGH CONFIDENCE

```
****************************************************************************
  FLOW PROCESS FROM NODE     116.00 TO NODE     116.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    12.12
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.295
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D       13.20      0.20      1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    13.60      SUBAREA RUNOFF(CFS) =    37.86
  EFFECTIVE AREA(ACRES) =     17.20   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       17.2       PEAK FLOW RATE(CFS) =      47.80
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       17.2  TC(MIN.) =     12.12
  EFFECTIVE AREA(ACRES) =     17.20  AREA-AVERAGED Fm(INCH/HR)=  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      47.80
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                        HUNSAKER & ASSOCIATES
                              Irvine,Inc
                    Planning * Engineering * Surveying
            Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "D", 50-YEAR STORM HIGH CONFIDENCE    *
* PORTOLLA TRACTS 15353 & 17300                                          *
* W.O. #3751-1                                                           *
 ************************************************************************

  FILE NAME: XD-50YR.DAT
  TIME/DATE OF STUDY: 09:26 01/23/2013
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   50.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

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

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

************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1030.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.611
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.997
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.90      0.25      1.000    77    8.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.04
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      3.04

************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1030.00  DOWNSTREAM(FEET) =    990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.1619
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.04
  FLOW VELOCITY(FEET/SEC) =   5.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.69   Tc(MIN.) =    9.30
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     547.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =    9.30
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.826
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        2.30      0.25      1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.30     SUBAREA RUNOFF(CFS) =     7.40
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.2       PEAK FLOW RATE(CFS) =      10.30

************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.10 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.1250
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.30
  FLOW VELOCITY(FEET/SEC) =   7.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.67   Tc(MIN.) =    9.97
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.10 =     867.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    202.10 TO NODE    202.10 IS CODE =  81
------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    9.97
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.679
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        2.20      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.40      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    8.04
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      17.92

********************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1057.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.171
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.857
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.70      0.25     1.000    77    9.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.27
  TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      2.27

********************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1057.00  DOWNSTREAM(FEET) =   1026.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE =  0.2441
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.27
  FLOW VELOCITY(FEET/SEC) =   5.59 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.38   Tc(MIN.) =    9.55
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.10 =     427.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.10 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    9.55
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.770
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.27
  EFFECTIVE AREA(ACRES) =      1.10   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =      3.48

********************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    204.20 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1026.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   389.00   CHANNEL SLOPE =  0.1954
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.48
  FLOW VELOCITY(FEET/SEC) =   6.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.06   Tc(MIN.) =   10.61
  LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.20 =     816.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    204.20 TO NODE    204.20 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.61
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.553
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.40      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.60      0.25     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    5.88
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =      9.15

********************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1118.00  DOWNSTREAM(FEET) =   1062.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.743
```

EXISTING CONDITION, DRAINAGE AREA "D"
50-YEAR STORM, HIGH CONFIDENCE

```
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.80      0.25      1.000    77    9.67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =       2.52
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.52

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    206.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1027.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.3182
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.52
 FLOW VELOCITY(FEET/SEC) =   5.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.32   Tc(MIN.) =    9.99
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    206.10 =     410.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    206.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.99
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.675
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.50      0.25      1.000    77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50   SUBAREA RUNOFF(CFS) =     1.54
 EFFECTIVE AREA(ACRES) =     1.30   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      1.3      PEAK FLOW RATE(CFS) =       4.01

****************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    207.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1027.00  DOWNSTREAM(FEET) =    930.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   423.00   CHANNEL SLOPE =  0.2293
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       4.01
 FLOW VELOCITY(FEET/SEC) =   6.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.11   Tc(MIN.) =   11.10
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =     833.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.10
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.462
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.30      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000    77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.90   SUBAREA RUNOFF(CFS) =     5.43
 EFFECTIVE AREA(ACRES) =     3.20   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      3.2      PEAK FLOW RATE(CFS) =       9.19

****************************************************************************
 FLOW PROCESS FROM NODE    200.10 TO NODE    200.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1134.00  DOWNSTREAM(FEET) =   1073.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.506
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.780
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        1.10      0.25      1.000    77    9.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =       3.49
 TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      3.49

****************************************************************************
 FLOW PROCESS FROM NODE    200.20 TO NODE    200.30 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1073.00  DOWNSTREAM(FEET) =    990.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.1137
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.570
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.70      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        1.80      0.25      1.000    77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.06
  AVERAGE FLOW DEPTH(FEET) =   0.26   TRAVEL TIME(MIN.) =   1.01
  Tc(MIN.) =   10.51
  SUBAREA AREA(ACRES) =     2.50       SUBAREA RUNOFF(CFS) =    7.44
  EFFECTIVE AREA(ACRES) =      3.60     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.6          PEAK FLOW RATE(CFS) =      10.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =  13.81
  LONGEST FLOWPATH FROM NODE    200.10 TO NODE    200.30 =    1030.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   10.51
  RAINFALL INTENSITY(INCH/HR) =   3.57
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       3.60
  TOTAL STREAM AREA(ACRES) =       3.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.73

****************************************************************************
  FLOW PROCESS FROM NODE    200.31 TO NODE    200.32 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1238.00  DOWNSTREAM(FEET) =   1204.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.538
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.40      0.20     1.000    83   10.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.20
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.20

****************************************************************************
  FLOW PROCESS FROM NODE    200.32 TO NODE    200.33 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1204.00  DOWNSTREAM(FEET) =   1150.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE =  0.3253
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.20
  FLOW VELOCITY(FEET/SEC) =   3.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =   11.50
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.33 =     466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.33 TO NODE    200.33 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.50
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.394
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.20      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.30      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =     1.42
  EFFECTIVE AREA(ACRES) =      0.90    AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        0.9          PEAK FLOW RATE(CFS) =       2.57

****************************************************************************
  FLOW PROCESS FROM NODE    200.33 TO NODE    200.34 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =   1100.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   159.00   CHANNEL SLOPE =  0.3145
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.57
  FLOW VELOCITY(FEET/SEC) =   5.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.46   Tc(MIN.) =   11.96
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.34 =     625.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.34 TO NODE    200.34 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.96
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.319
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.80      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        0.90      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =     4.70
  EFFECTIVE AREA(ACRES) =      2.60    AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        2.6          PEAK FLOW RATE(CFS) =       7.21
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     200.34 TO NODE      82.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    1100.00  DOWNSTREAM(FEET) =    1085.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =    187.00   CHANNEL SLOPE =  0.0791
 CHANNEL FLOW THRU SUBAREA(CFS) =        7.21
 FLOW VELOCITY(FEET/SEC) =   6.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =    0.48   Tc(MIN.) =   12.44
 LONGEST FLOWPATH FROM NODE     200.31 TO NODE      82.10 =      812.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      82.10 TO NODE      82.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.44
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.246
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        2.00      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.40      0.25      1.000    77
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.10      0.20      1.000    83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     3.50     SUBAREA RUNOFF(CFS) =     9.40
 EFFECTIVE AREA(ACRES) =      6.10   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         6.1      PEAK FLOW RATE(CFS) =      16.43

****************************************************************************
 FLOW PROCESS FROM NODE      82.10 TO NODE     200.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    1085.20  DOWNSTREAM(FEET) =    990.00
 FLOW LENGTH(FEET) =    392.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS    7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.02
 ESTIMATED PIPE DIAMETER(INCH) =  18.00     NUMBER OF PIPES =    1
 PIPE-FLOW(CFS) =       16.43
 PIPE TRAVEL TIME(MIN.) =    0.26     Tc(MIN.) =    12.70
 LONGEST FLOWPATH FROM NODE     200.31 TO NODE     200.30 =     1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     200.30 TO NODE     200.30 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.) =   12.70
 RAINFALL INTENSITY(INCH/HR) =   3.21
 AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =        6.10
 TOTAL STREAM AREA(ACRES) =        6.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       16.43

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       10.73   10.51    3.570  0.26( 0.26) 1.00        3.6      200.10
     2       16.43   12.70    3.208  0.25( 0.25) 1.00        6.1      200.31

 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       25.99   10.51    3.570  0.26( 0.26) 1.00        8.6      200.10
     2       25.98   12.70    3.208  0.26( 0.26) 1.00        9.7      200.31

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       25.99    Tc(MIN.) =    10.51
 EFFECTIVE AREA(ACRES) =       8.65   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        9.7
 LONGEST FLOWPATH FROM NODE     200.31 TO NODE     200.30 =     1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     200.30 TO NODE     200.40 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     990.00  DOWNSTREAM(FEET) =     970.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1250
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       25.99
 FLOW VELOCITY(FEET/SEC) =  10.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =    0.26   Tc(MIN.) =   10.78
 LONGEST FLOWPATH FROM NODE     200.31 TO NODE     200.40 =     1364.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     200.40 TO NODE     200.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.78
 *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.521
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.90      0.30      1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.20      0.25      1.000    77
 NATURAL FAIR COVER
```

EXISTING CONDITION, DRAINAGE AREA "D"
50-YEAR STORM, HIGH CONFIDENCE

```
  "OPEN BRUSH"                D        0.50      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     4.69
  EFFECTIVE AREA(ACRES) =     10.25   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.3       PEAK FLOW RATE(CFS) =      30.11

****************************************************************************
  FLOW PROCESS FROM NODE    200.40 TO NODE    200.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     970.00  DOWNSTREAM(FEET) =     949.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   156.00   CHANNEL SLOPE =  0.1346
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      30.11
  FLOW VELOCITY(FEET/SEC) =  10.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.25   Tc(MIN.) =   11.02
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.50 =    1520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.50 TO NODE    200.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.02
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.476
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.60      0.30     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.30      0.25     1.000    77
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.20      0.20     1.000    83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.10      SUBAREA RUNOFF(CFS) =     6.12
  EFFECTIVE AREA(ACRES) =     12.35   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.4       PEAK FLOW RATE(CFS) =      35.82
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       13.4  TC(MIN.) =     11.02
  EFFECTIVE AREA(ACRES) =     12.35  AREA-AVERAGED Fm(INCH/HR)=  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      35.82

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
      1       35.82   11.02    3.476  0.25( 0.25) 1.00       12.3     200.10
      2       34.78   13.21    3.137  0.25( 0.25) 1.00       13.4     200.31
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************** DESCRIPTION OF STUDY **************************
* EXISTING HYDROLOGY, AREAS "E" & "F", 50-YEAR STORM HIGH CONFIDENCE      *
* PORTOLA TRACTS 15353 & 17300                                            *
* W.O. #3751-1                                                            *
 **************************************************************************

  FILE NAME: X-EF-50.DAT
  TIME/DATE OF STUDY: 18:12 01/23/2013
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    50.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ======= ===== =======
  1   45.0     40.0    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

**************************************************************************
  FLOW PROCESS FROM NODE     400.00 TO NODE     400.10 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1078.00  DOWNSTREAM(FEET) =   1072.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.509
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  4.683
  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                 B        0.50      0.30      0.850    56   10.34
  COMMERCIAL                  B        0.20      0.30      0.100    56    6.51
  COMMERCIAL                  C        0.20      0.25      0.100    69    6.51
  PUBLIC PARK                 C        0.10      0.25      0.850    69   10.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.550
  SUBAREA RUNOFF(CFS) =      4.07
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      4.07

**************************************************************************
  FLOW PROCESS FROM NODE     400.10 TO NODE     401.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) = 1072.00  DOWNSTREAM ELEVATION(FEET) = 1058.00
  STREET LENGTH(FEET) =   321.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.40
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   11.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.01
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.89
  STREET FLOW TRAVEL TIME(MIN.) =   1.07   Tc(MIN.) =    7.58
  *  50 YEAR RAINFALL INTENSITY(INCH/HR) =  4.297
  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        0.40      0.30      0.850    56
  PUBLIC PARK                 C        1.10      0.25      0.850    69
  COMMERCIAL                  C        0.30      0.25      0.100    69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
  SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =     6.65
  EFFECTIVE AREA(ACRES) =      2.80    AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        2.8        PEAK FLOW RATE(CFS) =       10.38

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  13.87
  FLOW VELOCITY(FEET/SEC.) =  5.43   DEPTH*VELOCITY(FT*FT/SEC.) =   2.23
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    401.00 =     621.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     401.00 TO NODE     402.00 IS CODE =  62
--------------------------------------------------------------------------
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
UPSTREAM ELEVATION(FEET) = 1058.00  DOWNSTREAM ELEVATION(FEET) =  990.00
STREET LENGTH(FEET) =   803.00   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 45.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.018
OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.36
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.42
  HALFSTREET FLOOD WIDTH(FEET) =   14.65
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.75
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.29
STREET FLOW TRAVEL TIME(MIN.) =   1.73   Tc(MIN.) =    9.30
*  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.826
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"        B        0.60      0.30      0.500    56
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        C        0.20      0.25      0.500    69
PUBLIC PARK                 D        2.20      0.20      0.850    75
COMMERCIAL                  D        0.60      0.20      0.100    75
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.647
SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =   11.95
EFFECTIVE AREA(ACRES) =      6.40    AREA-AVERAGED Fm(INCH/HR) =  0.16
AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.65
TOTAL AREA(ACRES) =        6.4        PEAK FLOW RATE(CFS) =      21.13

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  16.29
FLOW VELOCITY(FEET/SEC.) =  8.25   DEPTH*VELOCITY(FT*FT/SEC.) =   3.74
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =    1424.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    9.30
*  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.826
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        0.30      0.30      0.850    56
NATURAL FAIR COVER
"OPEN BRUSH"                B        0.20      0.30      1.000    66
PUBLIC PARK                 D        0.60      0.20      0.850    75
NATURAL FAIR COVER
"OPEN BRUSH"                D        7.10      0.20      1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =   26.74
EFFECTIVE AREA(ACRES) =     14.60   AREA-AVERAGED Fm(INCH/HR) =  0.18
AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.84
TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      47.88

****************************************************************************
FLOW PROCESS FROM NODE    500.00 TO NODE    500.10 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    948.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.815
*  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.712
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"                D        1.30      0.20      1.000    83    9.81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      4.11
TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      4.11

****************************************************************************
FLOW PROCESS FROM NODE    500.10 TO NODE    501.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    948.00  DOWNSTREAM(FEET) =    920.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.1000
CHANNEL FLOW THRU SUBAREA(CFS) =      4.11
FLOW VELOCITY(FEET/SEC) =   6.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.73   Tc(MIN.) =   10.55
LONGEST FLOWPATH FROM NODE    500.00 TO NODE    501.00 =     580.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   10.55
*  50 YEAR RAINFALL INTENSITY(INCH/HR) =  3.564
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                B        1.10      0.30      1.000    66
NATURAL FAIR COVER
"OPEN BRUSH"                D        0.70      0.20      1.000    83
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    5.35
```

```
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       9.29
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        3.1  TC(MIN.) =     10.55
  EFFECTIVE AREA(ACRES) =      3.10  AREA-AVERAGED Fm(INCH/HR)=  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       9.29
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "A", 100-YEAR STORM HIGH CONFIDENCE    *
* PORTOLA TRACTS 15353 & 17300                                            *
* W.O. #3751-1                                                            *
 **************************************************************************

  FILE NAME: XA-100YR.DAT
  TIME/DATE OF STUDY: 08:49 01/04/2013
==========================================================================
  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
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)      (FT)   SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   45.0      40.0   0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  300.00
  ELEVATION DATA: UPSTREAM(FEET) =  1132.30  DOWNSTREAM(FEET) =  1088.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  10.148
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.124
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA     Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        2.00     0.20      1.000    96   10.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      7.06
  TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      7.06

**************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1088.30  DOWNSTREAM(FEET) =  1077.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =  388.00   CHANNEL SLOPE =  0.0286
  CHANNEL FLOW THRU SUBAREA(CFS) =      7.06
  FLOW VELOCITY(FEET/SEC) =  3.88 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  1.67   Tc(MIN.) =  11.82
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     688.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =  11.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.780
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA     Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        4.60     0.20      1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =  4.60   SUBAREA RUNOFF(CFS) =  14.82
  EFFECTIVE AREA(ACRES) =  6.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =  6.6   PEAK FLOW RATE(CFS) =  21.26

**************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1077.20  DOWNSTREAM(FEET) =  1073.00
  FLOW LENGTH(FEET) =  113.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.16
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =  1
  PIPE-FLOW(CFS) =  21.26
  PIPE TRAVEL TIME(MIN.) =  0.14    Tc(MIN.) =  11.96
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   1
--------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.96
  RAINFALL INTENSITY(INCH/HR) =   3.75
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.60
  TOTAL STREAM AREA(ACRES) =       6.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.26

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   14.35   RAINFALL INTENSITY(INCH/HR) =  3.38
  EFFECTIVE AREA(ACRES) =   130.34
  TOTAL AREA(ACRES) =   151.43        PEAK FLOW RATE(CFS) =    404.23
  AREA-AVERAGED Fm(INCH/HR) =   0.10  AREA-AVERAGED Fp(INCH/HR) =   0.20
  AREA-AVERAGED Ap =  0.50
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 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.) =   14.35
  RAINFALL INTENSITY(INCH/HR) =   3.38
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =     130.34
  TOTAL STREAM AREA(ACRES) =     151.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     404.23

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       21.26   11.96    3.754  0.20( 0.20) 1.00       6.6     300.00
      2      404.23   14.35    3.382  0.20( 0.10) 0.50     130.3     303.00

  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      396.36   11.96    3.754  0.20( 0.11) 0.53     115.2     300.00
      2      423.27   14.35    3.382  0.20( 0.10) 0.52     136.9     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     423.27    Tc(MIN.) =    14.35
  EFFECTIVE AREA(ACRES) =     136.94   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =      158.0
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     801.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1073.00  DOWNSTREAM(FEET) =  1056.00
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  40.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.98
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     423.27
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   14.46
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =    1031.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.46
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.367
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.30      0.20      0.100     91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     0.90
  EFFECTIVE AREA(ACRES) =    137.24   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =      158.3       PEAK FLOW RATE(CFS) =     423.27
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1056.00  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  35.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  45.79
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     423.27
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   14.47
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    307.00 =    1071.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
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```
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   14.47
 RAINFALL INTENSITY(INCH/HR) =   3.37
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.52
 EFFECTIVE STREAM AREA(ACRES) =     137.24
 TOTAL STREAM AREA(ACRES) =     158.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     423.27

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1103.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.756
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.488
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        0.80      0.20      1.000     96    8.76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.09
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      3.09

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1103.00  DOWNSTREAM(FEET) =   1067.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   644.00   CHANNEL SLOPE =  0.0548
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.175
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        3.40      0.20      1.000     96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      9.18
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.12
 AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   1.18
 Tc(MIN.) =    9.93
 SUBAREA AREA(ACRES) =     3.40      SUBAREA RUNOFF(CFS) =   12.16
 EFFECTIVE AREA(ACRES) =     4.20    AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      4.2        PEAK FLOW RATE(CFS) =     15.03

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =  10.87
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =     944.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1067.70  DOWNSTREAM(FEET) =   1052.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0177
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   1.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.800
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        4.70      0.20      1.000     96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     22.64
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.34
 AVERAGE FLOW DEPTH(FEET) =   0.68   TRAVEL TIME(MIN.) =   1.77
 Tc(MIN.) =   11.71
 SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =   15.23
 EFFECTIVE AREA(ACRES) =     8.90    AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      8.9        PEAK FLOW RATE(CFS) =     28.84

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.78   FLOW VELOCITY(FEET/SEC.) =   8.93
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    311.00 =    1831.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.71
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.800
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        0.70      0.30      1.000     84
 NATURAL FAIR COVER
 "OPEN BRUSH"               D       11.50      0.20      1.000     96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    12.20      SUBAREA RUNOFF(CFS) =   39.47
 EFFECTIVE AREA(ACRES) =    21.10    AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       21.1       PEAK FLOW RATE(CFS) =     68.31

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    307.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1051.10  DOWNSTREAM(FEET) =  1050.00
  FLOW LENGTH(FEET) =   123.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.13
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      68.31
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   11.91
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 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.) =   11.91
  RAINFALL INTENSITY(INCH/HR) =   3.76
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      21.10
  TOTAL STREAM AREA(ACRES) =      21.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      68.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      396.36   12.08    3.732  0.20( 0.11) 0.53     115.5     300.00
      1      423.27   14.47    3.365  0.20( 0.10) 0.52     137.2     303.00
      2       68.31   11.91    3.763  0.20( 0.20) 1.00      21.1     308.00

  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      462.29   11.91    3.763  0.20( 0.12) 0.60     134.9     308.00
      2      464.06   12.08    3.732  0.20( 0.12) 0.60     136.6     300.00
      3      483.93   14.47    3.365  0.20( 0.12) 0.59     158.3     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     483.93    Tc(MIN.) =    14.47
  EFFECTIVE AREA(ACRES) =     158.34   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.59
  TOTAL AREA(ACRES) =      179.4
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    307.00 =    1954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1050.00  DOWNSTREAM(FEET) =  1025.50
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.09
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     483.93
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   14.67
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.339
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        0.80      0.20      0.100    91
  SCHOOL                     D        2.40      0.20      0.600    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     3.20      SUBAREA RUNOFF(CFS) =     9.34
  EFFECTIVE AREA(ACRES) =    161.54   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.58
  TOTAL AREA(ACRES) =      182.6      PEAK FLOW RATE(CFS) =     483.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   14.67
  RAINFALL INTENSITY(INCH/HR) =   3.34
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.58
  EFFECTIVE STREAM AREA(ACRES) =     161.54
  TOTAL STREAM AREA(ACRES) =     182.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     483.93

****************************************************************************
  FLOW PROCESS FROM NODE    333.10 TO NODE    333.11 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1144.00  DOWNSTREAM(FEET) =   1094.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.892
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.185
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        1.00      0.20      1.000    96    9.89
```

EXISTING CONDITION, DRAINAGE AREA "A"
100-YEAR STORM, HIGH CONFIDENCE

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.59
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.59

****************************************************************************
  FLOW PROCESS FROM NODE    333.11 TO NODE    333.20 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1094.00  DOWNSTREAM(FEET) =   1075.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   275.00   CHANNEL SLOPE =  0.0684
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.59
  FLOW VELOCITY(FEET/SEC) =   5.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.90   Tc(MIN.) =   10.79
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.20 =     575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.20 TO NODE    333.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.982
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        5.50      0.20      1.000     96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =   18.72
  EFFECTIVE AREA(ACRES) =      6.50   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.5       PEAK FLOW RATE(CFS) =      22.13

****************************************************************************
  FLOW PROCESS FROM NODE    333.20 TO NODE    333.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1075.20  DOWNSTREAM(FEET) =   1032.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   135.00   CHANNEL SLOPE =  0.3200
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      22.13
  FLOW VELOCITY(FEET/SEC.) =  26.56   FLOW DEPTH(FEET) =   0.91
  TRAVEL TIME(MIN.) =   0.08   Tc(MIN.) =   10.87
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.30 =     710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.30 TO NODE    333.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1032.00  DOWNSTREAM ELEVATION(FEET) = 1027.00
  STREET LENGTH(FEET) =   123.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      24.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   19.96
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.44
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.35
  STREET FLOW TRAVEL TIME(MIN.) =   0.32   Tc(MIN.) =   11.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.899
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.60      0.20      0.100     91
  PUBLIC PARK                 D        0.60      0.20      0.850     91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
  SUBAREA AREA(ACRES) =     1.20      SUBAREA RUNOFF(CFS) =     4.11
  EFFECTIVE AREA(ACRES) =      7.70   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =      25.75

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.53   HALFSTREET FLOOD WIDTH(FEET) =  20.51
  FLOW VELOCITY(FEET/SEC.) =  6.52   DEPTH*VELOCITY(FT*FT/SEC.) =   3.45
  LONGEST FLOWPATH FROM NODE    333.10 TO NODE    333.00 =     833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    333.00 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.) =   11.19
  RAINFALL INTENSITY(INCH/HR) =   3.90
  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.92
  EFFECTIVE STREAM AREA(ACRES) =       7.70
  TOTAL STREAM AREA(ACRES) =       7.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.75

  ** CONFLUENCE DATA **
   STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      462.29   12.10     3.728  0.20( 0.12) 0.60      138.1      308.00
      1      464.06   12.28     3.697  0.20( 0.12) 0.60      139.8      300.00
      1      483.93   14.67     3.339  0.20( 0.12) 0.58      161.5      303.00
      2       25.75   11.19     3.899  0.20( 0.18) 0.92        7.7      333.10
```

```
 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      473.47   11.19    3.899  0.20( 0.12) 0.62     135.4     333.10
     2      486.85   12.10    3.728  0.20( 0.12) 0.62     145.8     308.00
     3      488.41   12.28    3.697  0.20( 0.12) 0.61     147.5     300.00
     4      505.80   14.67    3.339  0.20( 0.12) 0.60     169.2     303.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     505.80    Tc(MIN.) =    14.67
 EFFECTIVE AREA(ACRES) =     169.24   AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.60
 TOTAL AREA(ACRES) =      190.3
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    333.00 =    2354.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1025.50  DOWNSTREAM(FEET) =  1024.00
 FLOW LENGTH(FEET) =   109.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  75.0 INCH PIPE IS  59.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.51
 ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     505.80
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   14.76
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   14.76
 RAINFALL INTENSITY(INCH/HR) =   3.33
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =     169.24
 TOTAL STREAM AREA(ACRES) =     190.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     505.80

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    335.11 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   243.00
 ELEVATION DATA: UPSTREAM(FEET) =   1077.80  DOWNSTREAM(FEET) =   1075.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.680
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.241
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 C        0.20      0.25      0.100    86    6.68
 PUBLIC PARK                C        0.20      0.25      0.850    86   10.61
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.475
 SUBAREA RUNOFF(CFS) =      1.84
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.84

****************************************************************************
 FLOW PROCESS FROM NODE    335.11 TO NODE    335.10 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1075.00  DOWNSTREAM ELEVATION(FEET) = 1070.00
 STREET LENGTH(FEET) =   215.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 45.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.59
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.36
   HALFSTREET FLOOD WIDTH(FEET) =   11.13
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.53
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.27
 STREET FLOW TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =    7.70
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.832
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        0.20      0.20      0.100    91
 PUBLIC PARK                D        1.10      0.20      0.850    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.735
 SUBAREA AREA(ACRES) =     1.30      SUBAREA RUNOFF(CFS) =     5.48
 EFFECTIVE AREA(ACRES) =      1.70    AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.67
 TOTAL AREA(ACRES) =        1.7         PEAK FLOW RATE(CFS) =       7.18

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.55
 FLOW VELOCITY(FEET/SEC.) =  3.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.58
 LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.10 =     458.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.10 TO NODE    335.20 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 1070.00  DOWNSTREAM ELEVATION(FEET) = 1048.00
  STREET LENGTH(FEET) =   588.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.27
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   14.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.19
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.22
  STREET FLOW TRAVEL TIME(MIN.) =   1.89   Tc(MIN.) =    9.58
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.262
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        0.60      0.20      0.100    91
  PUBLIC PARK                 D        1.60      0.20      0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.645
  SUBAREA AREA(ACRES) =    2.20      SUBAREA RUNOFF(CFS) =    8.18
  EFFECTIVE AREA(ACRES) =      3.90    AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =      14.49

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  16.52
  FLOW VELOCITY(FEET/SEC.) =  5.50   DEPTH*VELOCITY(FT*FT/SEC.) =   2.52
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    335.20 =    1046.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.20 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1048.00  DOWNSTREAM(FEET) =  1024.00
  FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.31
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.49
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   10.20
  LONGEST FLOWPATH FROM NODE    335.00 TO NODE    336.00 =    1536.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.113
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  C        0.30      0.25      0.100    86
  PUBLIC PARK                 C        0.10      0.25      0.850    86
  COMMERCIAL                  D        1.50      0.20      0.100    91
  PUBLIC PARK                 D        1.50      0.20      0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.453
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =   12.30
  EFFECTIVE AREA(ACRES) =      7.30   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =        7.3        PEAK FLOW RATE(CFS) =      26.27

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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.) =   10.20
  RAINFALL INTENSITY(INCH/HR) =   4.11
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.56
  EFFECTIVE STREAM AREA(ACRES) =       7.30
  TOTAL STREAM AREA(ACRES) =       7.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      26.27

  ** CONFLUENCE DATA **
   STREAM       Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      473.47   11.29     3.881  0.20( 0.12) 0.62      135.4      333.10
      1      486.85   12.20     3.712  0.20( 0.12) 0.62      145.8      308.00
      1      488.41   12.37     3.681  0.20( 0.12) 0.61      147.5      300.00
      1      505.80   14.76     3.327  0.20( 0.12) 0.60      169.2      303.00
      2       26.27   10.20     4.113  0.20( 0.11) 0.56        7.3      335.00

  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      480.52   10.20     4.113  0.20( 0.12) 0.61      129.7      335.00
      2      498.21   11.29     3.881  0.20( 0.12) 0.61      142.7      333.10
      3      510.48   12.20     3.712  0.20( 0.12) 0.61      153.1      308.00
      4      511.85   12.37     3.681  0.20( 0.12) 0.61      154.8      300.00
      5      526.91   14.76     3.327  0.20( 0.12) 0.60      176.5      303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     526.91    Tc(MIN.) =    14.76
  EFFECTIVE AREA(ACRES) =     176.54   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =      197.6
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    336.00 =    2463.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    374.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1024.00  DOWNSTREAM(FEET) =   895.30
 FLOW LENGTH(FEET) =   549.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  35.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  57.22
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     526.91
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   14.92
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   14.92
 RAINFALL INTENSITY(INCH/HR) =   3.31
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =     176.54
 TOTAL STREAM AREA(ACRES) =     197.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     526.91

****************************************************************************
 FLOW PROCESS FROM NODE    373.00 TO NODE    373.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =   1018.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.657
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.809
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.20      0.20      1.000    96   11.66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.90
 TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      3.90

****************************************************************************
 FLOW PROCESS FROM NODE    373.10 TO NODE    374.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1018.00  DOWNSTREAM(FEET) =    895.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE =  0.3098
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.747
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.80      0.20      1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.77
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  19.43
 AVERAGE FLOW DEPTH(FEET) =   0.59   TRAVEL TIME(MIN.) =   0.34
 Tc(MIN.) =   12.00
 SUBAREA AREA(ACRES) =      1.80       SUBAREA RUNOFF(CFS) =     5.75
 EFFECTIVE AREA(ACRES) =      3.00     AREA-AVERAGED Fm(INCH/HR) =   0.20
 AREA-AVERAGED Fp(INCH/HR) =   0.20  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       3.0          PEAK FLOW RATE(CFS) =       9.58

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.67   FLOW VELOCITY(FEET/SEC.) =  21.07
 LONGEST FLOWPATH FROM NODE    373.00 TO NODE    374.00 =     696.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.747
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        7.30      0.20      1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.30      SUBAREA RUNOFF(CFS) =   23.30
 EFFECTIVE AREA(ACRES) =    10.30   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       10.3       PEAK FLOW RATE(CFS) =      32.88

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 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.) =   12.00
 RAINFALL INTENSITY(INCH/HR) =   3.75
 AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      10.30
 TOTAL STREAM AREA(ACRES) =      10.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      32.88
```

EXISTING CONDITION, DRAINAGE AREA "A"
100-YEAR STORM, HIGH CONFIDENCE

```
** CONFLUENCE DATA **
 STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR)  (INCH/HR)           (ACRES)     NODE
    1      480.52   10.36    4.076   0.20( 0.12) 0.61      129.7     335.00
    1      498.21   11.45    3.849   0.20( 0.12) 0.61      142.7     333.10
    1      510.48   12.36    3.684   0.20( 0.12) 0.61      153.1     308.00
    1      511.85   12.53    3.654   0.20( 0.12) 0.61      154.8     300.00
    1      526.91   14.92    3.307   0.20( 0.12) 0.60      176.5     303.00
    2       32.88   12.00    3.747   0.20( 0.20) 1.00       10.3     373.00

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      511.55   10.36    4.076   0.20( 0.13) 0.64      138.6     335.00
    2      530.49   11.45    3.849   0.20( 0.13) 0.64      152.6     333.10
    3      538.50   12.00    3.747   0.20( 0.13) 0.64      159.3     373.00
    4      542.78   12.36    3.684   0.20( 0.13) 0.64      163.4     308.00
    5      543.87   12.53    3.654   0.20( 0.13) 0.64      165.1     300.00
    6      555.71   14.92    3.307   0.20( 0.12) 0.62      186.8     303.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     555.71    Tc(MIN.) =    14.92
EFFECTIVE AREA(ACRES) =     186.84   AREA-AVERAGED Fm(INCH/HR) =  0.12
AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.62
TOTAL AREA(ACRES) =      207.9
LONGEST FLOWPATH FROM NODE    308.00 TO NODE    374.00 =    3012.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    374.00 TO NODE    377.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   895.30  DOWNSTREAM(FEET) =   890.00
 FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  53.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.99
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     555.71
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   15.03
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   15.03
 RAINFALL INTENSITY(INCH/HR) =   3.29
 AREA-AVERAGED Fm(INCH/HR) =  0.12
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.62
 EFFECTIVE STREAM AREA(ACRES) =     186.84
 TOTAL STREAM AREA(ACRES) =     207.93
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     555.71

****************************************************************************
 FLOW PROCESS FROM NODE    375.00 TO NODE    376.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1140.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.544
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.552
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                 D        1.30      0.20      1.000    96    8.54
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      5.09
 TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      5.09

****************************************************************************
 FLOW PROCESS FROM NODE    376.00 TO NODE    377.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1036.00  DOWNSTREAM(FEET) =    882.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.2034
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       5.09
 FLOW VELOCITY(FEET/SEC) =   6.70 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.88   Tc(MIN.) =   10.43
 LONGEST FLOWPATH FROM NODE    375.00 TO NODE    377.00 =    1057.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.43
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.061
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                 D        4.70      0.20      1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =   16.33
 EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       6.0       PEAK FLOW RATE(CFS) =      20.85

****************************************************************************
 FLOW PROCESS FROM NODE    377.00 TO NODE    377.00 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.) =   10.43
  RAINFALL INTENSITY(INCH/HR) =   4.06
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.00
  TOTAL STREAM AREA(ACRES) =       6.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      20.85

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1      511.55   10.46    4.052  0.20( 0.13) 0.64     138.6     335.00
      1      530.49   11.55    3.829  0.20( 0.13) 0.64     152.6     333.10
      1      538.50   12.10    3.728  0.20( 0.13) 0.64     159.3     373.00
      1      542.78   12.46    3.666  0.20( 0.13) 0.64     163.4     308.00
      1      543.87   12.64    3.637  0.20( 0.13) 0.64     165.1     300.00
      1      555.71   15.03    3.293  0.20( 0.12) 0.62     186.8     303.00
      2       20.85   10.43    4.061  0.20( 0.20) 1.00       6.0     375.00

  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      531.65   10.43    4.061  0.20( 0.13) 0.65     144.1     375.00
      2      532.35   10.46    4.052  0.20( 0.13) 0.65     144.6     335.00
      3      550.09   11.55    3.829  0.20( 0.13) 0.65     158.6     333.10
      4      557.55   12.10    3.728  0.20( 0.13) 0.65     165.3     373.00
      5      561.50   12.46    3.666  0.20( 0.13) 0.65     169.4     308.00
      6      562.43   12.64    3.637  0.20( 0.13) 0.65     171.1     300.00
      7      572.41   15.03    3.293  0.20( 0.13) 0.63     192.8     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     572.41    Tc(MIN.) =    15.03
  EFFECTIVE AREA(ACRES) =     192.84   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =      213.9
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    377.00 =    3182.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    381.00 TO NODE    382.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    992.00  DOWNSTREAM(FEET) =    914.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.404
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               C        0.20      0.25      1.000    92    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"               D        1.10      0.20      1.000    96    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.91
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      4.91

****************************************************************************
  FLOW PROCESS FROM NODE    383.10 TO NODE    383.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1022.00  DOWNSTREAM(FEET) =   1008.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.730
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.496
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                D        0.50      0.20      0.850    91    8.73
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.95
  TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.95

****************************************************************************
  FLOW PROCESS FROM NODE    383.20 TO NODE    383.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1008.00  DOWNSTREAM(FEET) =    988.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   347.00   CHANNEL SLOPE =  0.0576
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.353
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                C        2.00      0.25      0.850    86
  PUBLIC PARK                D        2.40      0.20      0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     10.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.46
  AVERAGE FLOW DEPTH(FEET) =   0.94   TRAVEL TIME(MIN.) =   0.50
  Tc(MIN.) =    9.23
  SUBAREA AREA(ACRES) =     4.40      SUBAREA RUNOFF(CFS) =   16.49
  EFFECTIVE AREA(ACRES) =     4.90     AREA-AVERAGED Fm(INCH/HR) =   0.19
  AREA-AVERAGED Fp(INCH/HR) =   0.22  AREA-AVERAGED Ap =   0.85
  TOTAL AREA(ACRES) =      4.9        PEAK FLOW RATE(CFS) =     18.37

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.18   FLOW VELOCITY(FEET/SEC.) =  13.24
```

```
 LONGEST FLOWPATH FROM NODE    383.10 TO NODE    383.00 =     647.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    384.10 TO NODE    384.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =   1036.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.004
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000    92   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.03
 TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      2.03

****************************************************************************
 FLOW PROCESS FROM NODE    385.10 TO NODE    385.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1105.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.896
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.448
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.00      0.20      1.000    96    8.90
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.82
 TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.82

****************************************************************************
 FLOW PROCESS FROM NODE    385.20 TO NODE    385.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    980.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   390.00   CHANNEL SLOPE =  0.3205
 CHANNEL FLOW THRU SUBAREA(CFS) =      3.82
 FLOW VELOCITY(FEET/SEC) =   4.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.31   Tc(MIN.) =   10.21
 LONGEST FLOWPATH FROM NODE    385.10 TO NODE    385.00 =     690.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    385.00 TO NODE    385.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.21
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.110
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.30      0.25      1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.30      0.20      1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.60     SUBAREA RUNOFF(CFS) =     9.14
 EFFECTIVE AREA(ACRES) =     3.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      3.6      PEAK FLOW RATE(CFS) =     12.66
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       3.6  TC(MIN.) =     10.21
 EFFECTIVE AREA(ACRES) =     3.60  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =     12.66
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "B", 100-YEAR STORM HIGH CONFIDENCE    *
* PORTOLA TRACTS 15353 & 17300                                            *
* W.O. #3751-1                                                            *
 **************************************************************************

  FILE NAME: XB-100YR.DAT
  TIME/DATE OF STUDY: 19:22 01/03/2013
==========================================================================
  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
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

**************************************************************************
  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) =  300.00
  ELEVATION DATA: UPSTREAM(FEET) =  1207.00  DOWNSTREAM(FEET) =  1142.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  9.386
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.313
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.80      0.20      1.000    96    9.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.96
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.96

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1142.00  DOWNSTREAM(FEET) =  1136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  318.00   CHANNEL SLOPE =  0.0189
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.96
  FLOW VELOCITY(FEET/SEC) =  2.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  2.06   Tc(MIN.) =  11.45
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     618.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =  11.45
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.849
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        2.80      0.20      1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =  2.80   SUBAREA RUNOFF(CFS) =  9.20
  EFFECTIVE AREA(ACRES) =  3.60   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =  3.6   PEAK FLOW RATE(CFS) =  11.82

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1136.00  DOWNSTREAM(FEET) =  1124.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  375.00   CHANNEL SLOPE =  0.0320
  CHANNEL FLOW THRU SUBAREA(CFS) =     11.82
  FLOW VELOCITY(FEET/SEC) =  4.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  1.34   Tc(MIN.) =  12.79
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     993.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
```

EXISTING CONDITION, DRAINAGE AREA "B"
100-YEAR STORM, HIGH CONFIDENCE

```
 MAINLINE Tc(MIN.) =   12.79
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.613
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.50      0.30      1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        3.50      0.20      1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.00      SUBAREA RUNOFF(CFS) =   15.22
 EFFECTIVE AREA(ACRES) =      8.60   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        8.6       PEAK FLOW RATE(CFS) =      26.28

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1124.00  DOWNSTREAM(FEET) =   1120.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0148
 CHANNEL FLOW THRU SUBAREA(CFS) =      26.28
 FLOW VELOCITY(FEET/SEC) =   3.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =   13.76
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =    1223.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.76
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.464
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        4.50      0.20      1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     4.50      SUBAREA RUNOFF(CFS) =   13.22
 EFFECTIVE AREA(ACRES) =     13.10   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      38.34

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1120.60  DOWNSTREAM(FEET) =  1052.00
 FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.04
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      38.34
 PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   14.14
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =    1773.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1052.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0718
 CHANNEL FLOW THRU SUBAREA(CFS) =      38.34
 FLOW VELOCITY(FEET/SEC) =   9.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.03   Tc(MIN.) =   15.18
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =    2369.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.18
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.275
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.10      0.25      1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        5.40      0.20      1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     5.50      SUBAREA RUNOFF(CFS) =   15.22
 EFFECTIVE AREA(ACRES) =     18.60   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       18.6       PEAK FLOW RATE(CFS) =      51.33

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   15.18
 RAINFALL INTENSITY(INCH/HR) =   3.27
 AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      18.60
 TOTAL STREAM AREA(ACRES) =      18.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      51.33

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   1242.00  DOWNSTREAM(FEET) =   1216.20

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.292
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.880
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.70      0.30      1.000     84   11.29
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.26
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      2.26

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1216.20  DOWNSTREAM(FEET) =   1188.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   460.00   CHANNEL SLOPE =  0.0613
 CHANNEL FLOW THRU SUBAREA(CFS) =      2.26
 FLOW VELOCITY(FEET/SEC) =   4.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.75   Tc(MIN.) =   13.05
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     10.00 =     760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.05
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.571
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.60      0.30      1.000     84
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.80      0.20      1.000     96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     2.40     SUBAREA RUNOFF(CFS) =     7.14
 EFFECTIVE AREA(ACRES) =     3.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      3.1      PEAK FLOW RATE(CFS) =      9.20

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1188.00  DOWNSTREAM(FEET) =   1107.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.1419
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      9.20
 FLOW VELOCITY(FEET/SEC) =   7.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.22   Tc(MIN.) =   14.26
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     11.00 =    1325.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     11.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.26
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.394
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        4.80      0.30      1.000     84
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        2.20      0.20      1.000     96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     7.00     SUBAREA RUNOFF(CFS) =    19.69
 EFFECTIVE AREA(ACRES) =    10.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      10.1      PEAK FLOW RATE(CFS) =      28.39

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1107.80  DOWNSTREAM(FEET) =   1082.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE =  0.0956
 CHANNEL FLOW THRU SUBAREA(CFS) =     28.39
 FLOW VELOCITY(FEET/SEC) =  10.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.44   Tc(MIN.) =   14.70
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     12.00 =    1595.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.70
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.335
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        5.70      0.30      1.000     84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000     92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.30      0.20      1.000     96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     6.60     SUBAREA RUNOFF(CFS) =    18.08
 EFFECTIVE AREA(ACRES) =    16.70   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      16.7      PEAK FLOW RATE(CFS) =      45.94
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1082.00  DOWNSTREAM(FEET) =  1062.00
 FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.09
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      45.94
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   14.99
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     13.00 =    1919.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1009.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   870.00   CHANNEL SLOPE =  0.0607
 CHANNEL FLOW THRU SUBAREA(CFS) =      45.94
 FLOW VELOCITY(FEET/SEC) =   9.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.56   Tc(MIN.) =   16.55
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.55
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.117
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                 C       10.30      0.25      1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                 D        2.10      0.20      1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.40     SUBAREA RUNOFF(CFS) =   32.09
 EFFECTIVE AREA(ACRES) =     29.10   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       29.1      PEAK FLOW RATE(CFS) =      74.75

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =   16.55
 RAINFALL INTENSITY(INCH/HR) =   3.12
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      29.10
 TOTAL STREAM AREA(ACRES) =      29.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      74.75

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       51.33   15.18    3.275  0.21( 0.21) 1.00      18.6       1.00
     2       74.75   16.55    3.117  0.26( 0.26) 1.00      29.1       8.00

 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      123.70   15.18    3.275  0.24( 0.24) 1.00      45.3       1.00
     2      123.44   16.55    3.117  0.24( 0.24) 1.00      47.7       8.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     123.70    Tc(MIN.) =    15.18
 EFFECTIVE AREA(ACRES) =      45.29   AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       47.7
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE      7.00 =    2789.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE     14.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1012.00  DOWNSTREAM(FEET) =    954.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE =  0.3222
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     123.70
 FLOW VELOCITY(FEET/SEC.) =  35.94   FLOW DEPTH(FEET) =   0.61
 TRAVEL TIME(MIN.) =   0.08   Tc(MIN.) =   15.26
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     14.00 =    2969.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     82.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    954.00  DOWNSTREAM(FEET) =    917.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0663
 CHANNEL FLOW THRU SUBAREA(CFS) =     123.70
 FLOW VELOCITY(FEET/SEC) =  13.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.71   Tc(MIN.) =   15.97
 LONGEST FLOWPATH FROM NODE      8.00 TO NODE     82.00 =    3527.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     82.00 TO NODE     82.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
 MAINLINE Tc(MIN.) =   15.97
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.180
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.10      0.25      1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D       29.30      0.20      1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   29.40      SUBAREA RUNOFF(CFS) =   78.85
 EFFECTIVE AREA(ACRES) =     74.69   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       77.1       PEAK FLOW RATE(CFS) =     198.69
==============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       77.1  TC(MIN.) =     15.97
 EFFECTIVE AREA(ACRES) =     74.69  AREA-AVERAGED Fm(INCH/HR)=  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =     198.69

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      198.69   15.97    3.180  0.22( 0.22) 1.00       74.7       1.00
     2      194.85   17.34    3.034  0.23( 0.23) 1.00       77.1       8.00
==============================================================================
==============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                       Planning * Engineering * Surveying
              Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "C", 100-YEAR STORM HIGH CONFIDENCE    *
* PORTOLLA TRACTS 15353 & 17300                                            *
* W.O. #3751-1                                                             *
 ************************************************************************

  FILE NAME: XC-100YR.DAT
  TIME/DATE OF STUDY: 14:10 01/22/2013
==========================================================================
  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
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

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

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

**************************************************************************
  FLOW PROCESS FROM NODE     113.00 TO NODE     114.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =   1128.00  DOWNSTREAM(FEET) =   1050.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.050
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.404
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    92    9.05
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        0.20      0.20      1.000    96    9.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.25
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =      2.25

**************************************************************************
  FLOW PROCESS FROM NODE     114.00 TO NODE     115.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   295.00   CHANNEL SLOPE =  0.1695
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.25
  FLOW VELOCITY(FEET/SEC) =   5.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.88   Tc(MIN.) =    9.93
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    115.00 =     595.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     115.00 TO NODE     115.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    9.93
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.176
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        1.40      0.25      1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.60      0.20      1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.00     SUBAREA RUNOFF(CFS) =   10.67
  EFFECTIVE AREA(ACRES) =      3.60   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.6       PEAK FLOW RATE(CFS) =      12.80

**************************************************************************
  FLOW PROCESS FROM NODE     115.00 TO NODE     116.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    870.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1055.00   CHANNEL SLOPE =  0.1232
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.80
  FLOW VELOCITY(FEET/SEC) =   8.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.09   Tc(MIN.) =   12.02
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    116.00 =    1650.00 FEET.
```

EXISTING CONDITION, DRAINAGE AREA "C"
100-YEAR STORM, HIGH CONFIDENCE

```
****************************************************************************
  FLOW PROCESS FROM NODE     116.00 TO NODE     116.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.743
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.40      0.25      1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"                D       13.20      0.20      1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.60      SUBAREA RUNOFF(CFS) =   43.35
  EFFECTIVE AREA(ACRES) =     17.20   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       17.2       PEAK FLOW RATE(CFS) =      54.75
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       17.2  TC(MIN.) =     12.02
  EFFECTIVE AREA(ACRES) =     17.20  AREA-AVERAGED Fm(INCH/HR)=  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      54.75
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "C"
100-YEAR STORM, HIGH CONFIDENCE

```
************************************************************************
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                        Analysis prepared by:

                        HUNSAKER & ASSOCIATES
                              Irvine,Inc
                     Planning * Engineering * Surveying
             Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING HYDROLOGY, DRAINAGE AREA "D", 100-YEAR STORM HIGH CONFIDENCE    *
* PORTOLLA TRACTS 15353 & 17300                                           *
* W.O. #3751-1                                                            *
 ************************************************************************

  FILE NAME: XD-100YR.DAT
  TIME/DATE OF STUDY: 19:31 01/22/2013
========================================================================
  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
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.    (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 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

************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  300.00
  ELEVATION DATA: UPSTREAM(FEET) =  1130.00  DOWNSTREAM(FEET) =  1030.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  8.611
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.531
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.90      0.25      1.000    92    8.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.47
  TOTAL AREA(ACRES) =      0.90   PEAK FLOW RATE(CFS) =      3.47

************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1030.00  DOWNSTREAM(FEET) =    990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.1619
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.47
  FLOW VELOCITY(FEET/SEC) =   6.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.67   Tc(MIN.) =    9.28
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     547.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =    9.28
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.340
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        2.30      0.25      1.000    92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.30   SUBAREA RUNOFF(CFS) =     8.47
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      3.2    PEAK FLOW RATE(CFS) =     11.78

************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.10 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.1250
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.78
  FLOW VELOCITY(FEET/SEC) =   8.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.65   Tc(MIN.) =    9.93
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.10 =     867.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    202.10 TO NODE    202.10 IS CODE =  81
------------------------------------------------------------------------
```

EXISTING CONDITION, DRAINAGE AREA "D"
100-YEAR STORM, HIGH CONFIDENCE

```
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 MAINLINE Tc(MIN.) =    9.93
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.176
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        2.20      0.25      1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        0.40      0.20      1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    9.20
 EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      20.51

********************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  21
--------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =   1057.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.171
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.371
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.70      0.25      1.000    92    9.17
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.60
 TOTAL AREA(ACRES) =      0.70   PEAK FLOW RATE(CFS) =      2.60

********************************************************************************
 FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  52
--------------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1057.00  DOWNSTREAM(FEET) =   1026.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE =  0.2441
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.60
 FLOW VELOCITY(FEET/SEC) =   5.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.37   Tc(MIN.) =    9.54
 LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.10 =     427.00 FEET.

********************************************************************************
 FLOW PROCESS FROM NODE    204.10 TO NODE    204.10 IS CODE =  81
--------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 MAINLINE Tc(MIN.) =    9.54
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.273
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.40      0.25      1.000    92
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.45
 EFFECTIVE AREA(ACRES) =      1.10   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =      3.98

********************************************************************************
 FLOW PROCESS FROM NODE    204.10 TO NODE    204.20 IS CODE =  52
--------------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1026.00  DOWNSTREAM(FEET) =    950.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   389.00   CHANNEL SLOPE =  0.1954
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.98
 FLOW VELOCITY(FEET/SEC) =   6.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =   10.56
 LONGEST FLOWPATH FROM NODE    203.00 TO NODE    204.20 =     816.00 FEET.

********************************************************************************
 FLOW PROCESS FROM NODE    204.20 TO NODE    204.20 IS CODE =  81
--------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 MAINLINE Tc(MIN.) =   10.56
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.031
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.40      0.30      1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000    92
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    6.74
 EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =      10.48

********************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  21
--------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1118.00  DOWNSTREAM(FEET) =   1062.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.670
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.240
```

EXISTING CONDITION, DRAINAGE AREA "D"
100-YEAR STORM, HIGH CONFIDENCE

```
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.80      0.25      1.000     92    9.67
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.87
 TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.87

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    206.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1062.00  DOWNSTREAM(FEET) =   1027.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.3182
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.87
 FLOW VELOCITY(FEET/SEC) =   5.88 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.31   Tc(MIN.) =    9.98
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    206.10 =     410.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    206.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.98
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.163
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.50      0.25      1.000     92
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50      SUBAREA RUNOFF(CFS) =     1.76
 EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       4.58

****************************************************************************
 FLOW PROCESS FROM NODE    206.10 TO NODE    207.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1027.00  DOWNSTREAM(FEET) =    930.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   423.00   CHANNEL SLOPE =  0.2293
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       4.58
 FLOW VELOCITY(FEET/SEC) =   6.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.08   Tc(MIN.) =   11.06
 LONGEST FLOWPATH FROM NODE    205.00 TO NODE    207.00 =     833.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.06
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.926
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        1.30      0.30      1.000     84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.60      0.25      1.000     92
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.90      SUBAREA RUNOFF(CFS) =     6.23
 EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        3.2       PEAK FLOW RATE(CFS) =      10.53

****************************************************************************
 FLOW PROCESS FROM NODE    200.10 TO NODE    200.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1134.00  DOWNSTREAM(FEET) =   1073.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.506
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.282
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        1.10      0.25      1.000     92    9.51
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.99
 TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      3.99

****************************************************************************
 FLOW PROCESS FROM NODE    200.20 TO NODE    200.30 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1073.00  DOWNSTREAM(FEET) =    990.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.1137
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.052
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.70      0.30      1.000     84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        1.80      0.25      1.000     92
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

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 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.25
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.67
 AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   0.96
 Tc(MIN.) =   10.47
 SUBAREA AREA(ACRES) =     2.50       SUBAREA RUNOFF(CFS) =    8.52
 EFFECTIVE AREA(ACRES) =      3.60     AREA-AVERAGED Fm(INCH/HR) =   0.26
 AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        3.6          PEAK FLOW RATE(CFS) =      12.29

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =  14.40
 LONGEST FLOWPATH FROM NODE    200.10 TO NODE    200.30 =    1030.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.30 TO NODE    200.30 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.) =   10.47
 RAINFALL INTENSITY(INCH/HR) =   4.05
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       3.60
 TOTAL STREAM AREA(ACRES) =       3.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.29

****************************************************************************
 FLOW PROCESS FROM NODE    200.31 TO NODE    200.32 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1238.00  DOWNSTREAM(FEET) =   1204.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.685
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.004
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        0.40      0.20     1.000     96   10.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.37
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.37

****************************************************************************
 FLOW PROCESS FROM NODE    200.32 TO NODE    200.33 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1204.00  DOWNSTREAM(FEET) =   1150.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE =  0.3253
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.37
 FLOW VELOCITY(FEET/SEC) =   3.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.78   Tc(MIN.) =   11.47
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.33 =     466.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.33 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.47
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.846
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        0.20      0.30     1.000     84
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        0.30      0.20     1.000     96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     0.50       SUBAREA RUNOFF(CFS) =     1.62
 EFFECTIVE AREA(ACRES) =      0.90    AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        0.9          PEAK FLOW RATE(CFS) =       2.94

****************************************************************************
 FLOW PROCESS FROM NODE    200.33 TO NODE    200.34 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =   1100.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   159.00   CHANNEL SLOPE =  0.3145
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.94
 FLOW VELOCITY(FEET/SEC) =   5.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.45   Tc(MIN.) =   11.91
 LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.34 =     625.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.34 TO NODE    200.34 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.91
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.762
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        0.80      0.30     1.000     84
 NATURAL FAIR COVER
 "OPEN BRUSH"               D        0.90      0.20     1.000     96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.70       SUBAREA RUNOFF(CFS) =     5.38
 EFFECTIVE AREA(ACRES) =      2.60    AREA-AVERAGED Fm(INCH/HR) =  0.24
 AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6          PEAK FLOW RATE(CFS) =       8.25
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     200.34 TO NODE      82.10 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =   1085.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE =  0.0791
 CHANNEL FLOW THRU SUBAREA(CFS) =       8.25
 FLOW VELOCITY(FEET/SEC) =   6.70 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.47   Tc(MIN.) =   12.38
 LONGEST FLOWPATH FROM NODE     200.31 TO NODE      82.10 =      812.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      82.10 TO NODE      82.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.38
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.680
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        2.00      0.30      1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.40      0.25      1.000    92
 NATURAL FAIR COVER
 "OPEN BRUSH"                D        1.10      0.20      1.000    96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     3.50      SUBAREA RUNOFF(CFS) =   10.77
 EFFECTIVE AREA(ACRES) =      6.10   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =      18.82

****************************************************************************
 FLOW PROCESS FROM NODE      82.10 TO NODE     200.30 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1085.20  DOWNSTREAM(FEET) =   990.00
 FLOW LENGTH(FEET) =   392.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.95
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      18.82
 PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   12.63
 LONGEST FLOWPATH FROM NODE     200.31 TO NODE     200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     200.30 TO NODE     200.30 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.) =   12.63
 RAINFALL INTENSITY(INCH/HR) =   3.64
 AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       6.10
 TOTAL STREAM AREA(ACRES) =       6.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      18.82

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       12.29   10.47    4.052  0.26( 0.26) 1.00        3.6      200.10
     2       18.82   12.63    3.638  0.25( 0.25) 1.00        6.1      200.31

 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       29.79   10.47    4.052  0.26( 0.26) 1.00        8.7      200.10
     2       29.77   12.63    3.638  0.26( 0.26) 1.00        9.7      200.31

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      29.79    Tc(MIN.) =    10.47
 EFFECTIVE AREA(ACRES) =       8.65   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        9.7
 LONGEST FLOWPATH FROM NODE     200.31 TO NODE     200.30 =    1204.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     200.30 TO NODE     200.40 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    970.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE =  0.1250
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      29.79
 FLOW VELOCITY(FEET/SEC) =  10.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.25   Tc(MIN.) =   10.72
 LONGEST FLOWPATH FROM NODE     200.31 TO NODE     200.40 =    1364.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     200.40 TO NODE     200.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.72
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.997
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        0.90      0.30      1.000    84
 NATURAL FAIR COVER
 "OPEN BRUSH"                C        0.20      0.25      1.000    92
 NATURAL FAIR COVER
```

```
  "OPEN BRUSH"                D        0.50      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     5.38
  EFFECTIVE AREA(ACRES) =     10.25   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.3       PEAK FLOW RATE(CFS) =      34.52

****************************************************************************
  FLOW PROCESS FROM NODE    200.40 TO NODE    200.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    970.00  DOWNSTREAM(FEET) =    949.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   156.00   CHANNEL SLOPE =  0.1346
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      34.52
  FLOW VELOCITY(FEET/SEC) =  11.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.24   Tc(MIN.) =   10.96
  LONGEST FLOWPATH FROM NODE    200.31 TO NODE    200.50 =    1520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.50 TO NODE    200.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.96
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.947
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.60      0.30     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"                C        0.30      0.25     1.000    92
  NATURAL FAIR COVER
  "OPEN BRUSH"                D        1.20      0.20     1.000    96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     2.10      SUBAREA RUNOFF(CFS) =     7.01
  EFFECTIVE AREA(ACRES) =     12.35   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.4       PEAK FLOW RATE(CFS) =      41.08
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       13.4  TC(MIN.) =     10.96
  EFFECTIVE AREA(ACRES) =     12.35  AREA-AVERAGED Fm(INCH/HR)=  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      41.08

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       41.08   10.96    3.947  0.25( 0.25) 1.00      12.4     200.10
      2       39.88   13.12    3.560  0.25( 0.25) 1.00      13.4     200.31
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING CONDITION, DRAINAGE AREA "D"
100-YEAR STORM, HIGH CONFIDENCE

```
************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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 ************************** DESCRIPTION OF STUDY **************************
* EXISTING HYDROLOGY, AREAS "E" & "F", 100-YEAR STORM HIGH CONFIDENCE      *
* PORTOLA TRACTS 15353 & 17300                                            *
* W.O. #3751-1                                                            *
 ************************************************************************

  FILE NAME: X-EF-100.DAT
  TIME/DATE OF STUDY: 18:03 01/23/2013
========================================================================
  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
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)      (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   45.0     40.0    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

************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    400.10 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  300.00
  ELEVATION DATA: UPSTREAM(FEET) =  1078.00  DOWNSTREAM(FEET) =  1072.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =  6.509
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.319
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA     Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.50     0.30      0.850    76   10.34
  COMMERCIAL                 B        0.20     0.30      0.100    76    6.51
  COMMERCIAL                 C        0.20     0.25      0.100    86    6.51
  PUBLIC PARK                C        0.10     0.25      0.850    86   10.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.550
  SUBAREA RUNOFF(CFS) =  4.64
  TOTAL AREA(ACRES) =  1.00   PEAK FLOW RATE(CFS) =  4.64

************************************************************************
  FLOW PROCESS FROM NODE    400.10 TO NODE    401.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1072.00  DOWNSTREAM ELEVATION(FEET) = 1058.00
  STREET LENGTH(FEET) =  321.00  CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 45.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =  8.45
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =  12.70
    AVERAGE FLOW VELOCITY(FEET/SEC.) =  5.18
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =  2.01
  STREET FLOW TRAVEL TIME(MIN.) =  1.03  Tc(MIN.) =  7.54
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.889
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA     Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.40     0.30      0.850    76
  PUBLIC PARK                C        1.10     0.25      0.850    86
  COMMERCIAL                 C        0.30     0.25      0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
  SUBAREA AREA(ACRES) =  1.80  SUBAREA RUNOFF(CFS) =  7.61
  EFFECTIVE AREA(ACRES) =  2.80  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.66
  TOTAL AREA(ACRES) =  2.8  PEAK FLOW RATE(CFS) =  11.87

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43  HALFSTREET FLOOD WIDTH(FEET) =  14.73
  FLOW VELOCITY(FEET/SEC.) =  5.57  DEPTH*VELOCITY(FT*FT/SEC.) =  2.37
  LONGEST FLOWPATH FROM NODE  400.00 TO NODE  401.00 =  621.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  62
------------------------------------------------------------------------
```

```
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
UPSTREAM ELEVATION(FEET) = 1058.00  DOWNSTREAM ELEVATION(FEET) =  990.00
STREET LENGTH(FEET) =   803.00   CURB HEIGHT(INCHES) =  8.0
STREET HALFWIDTH(FEET) = 45.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  40.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.018
OUTSIDE STREET CROSSFALL(DECIMAL) =  0.018

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.71
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.44
  HALFSTREET FLOOD WIDTH(FEET) =   15.51
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.99
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.51
STREET FLOW TRAVEL TIME(MIN.) =   1.67   Tc(MIN.) =    9.22
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.358
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        B        0.60      0.30      0.500    76
RESIDENTIAL
"5-7 DWELLINGS/ACRE"        C        0.20      0.25      0.500    86
PUBLIC PARK                 D        2.20      0.20      0.850    91
COMMERCIAL                  D        0.60      0.20      0.100    91
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.647
SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =   13.67
EFFECTIVE AREA(ACRES) =      6.40    AREA-AVERAGED Fm(INCH/HR) =  0.16
AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.65
TOTAL AREA(ACRES) =        6.4        PEAK FLOW RATE(CFS) =      24.20

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.23
FLOW VELOCITY(FEET/SEC.) =  8.51   DEPTH*VELOCITY(FT*FT/SEC.) =   4.00
LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =    1424.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =    9.22
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.358
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
PUBLIC PARK                 B        0.30      0.30      0.850    76
NATURAL FAIR COVER
"OPEN BRUSH"                B        0.20      0.30      1.000    84
PUBLIC PARK                 D        0.60      0.20      0.850    91
NATURAL FAIR COVER
"OPEN BRUSH"                D        7.10      0.20      1.000    96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =   30.67
EFFECTIVE AREA(ACRES) =     14.60   AREA-AVERAGED Fm(INCH/HR) =  0.18
AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  0.84
TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      54.87

****************************************************************************
FLOW PROCESS FROM NODE    500.00 TO NODE    500.10 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    948.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.815
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.204
SUBAREA Tc AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"                D        1.30      0.20      1.000    96    9.81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      4.68
TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      4.68

****************************************************************************
FLOW PROCESS FROM NODE    500.10 TO NODE    501.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    948.00  DOWNSTREAM(FEET) =    920.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.1000
CHANNEL FLOW THRU SUBAREA(CFS) =      4.68
FLOW VELOCITY(FEET/SEC) =   6.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.71   Tc(MIN.) =   10.52
LONGEST FLOWPATH FROM NODE    500.00 TO NODE    501.00 =     580.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    501.00 TO NODE    501.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   10.52
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.039
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                B        1.10      0.30      1.000    84
NATURAL FAIR COVER
"OPEN BRUSH"                D        0.70      0.20      1.000    96
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    6.12
```

```
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =      10.61
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        3.1  TC(MIN.) =     10.52
  EFFECTIVE AREA(ACRES) =      3.10  AREA-AVERAGED Fm(INCH/HR)=  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      10.61
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```