THE RANCH PLAN PLANNED COMMUNITY

PLANNING AREAS 3 AND 4 RUNOFF MANAGEMENT PLAN

Michael Baker
INTERNATIONAL

TECHNICAL APPENDIX B.3

Existing Rational Method Expected Value
(2-, 5-, 10-, 25-, 50- and 100-year)

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

                      Michael Baker International
                    5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 3 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 2-YR EV MARCH 2019 CCHIU                                           *
 **********************************************************************

   FILE NAME: X30302EV.DAT
   TIME/DATE OF STUDY: 06:35 03/26/2019
================================================================================
   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; 0.366
   10)    90.00; 0.300
   11)   120.00; 0.246
   12)   180.00; 0.190
   13)   360.00; 0.136
   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   60.0    30.0     0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
   2   50.0    25.0     0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
   3   40.0    20.0     0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
   4   30.0    15.0     0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
   5   20.0    10.0     0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30300.00 TO NODE  30301.00 IS CODE =  21
------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
  ELEVATION DATA: UPSTREAM(FEET) =    622.00  DOWNSTREAM(FEET) =    551.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.676
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.095
  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
  "CHAPARRAL,NARROWLEAF"    -        1.80     0.60      1.000     0   9.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.80
  TOTAL AREA(ACRES) =       1.80   PEAK FLOW RATE(CFS) =       0.80


********************************************************************************
  FLOW PROCESS FROM NODE  30301.00 TO NODE  30302.00 IS CODE =  51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    551.00  DOWNSTREAM(FEET) =    508.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 2187.00    CHANNEL SLOPE = 0.0197
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.552
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        6.70     0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.85
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  1.71
  AVERAGE FLOW DEPTH(FEET) =  0.41   TRAVEL TIME(MIN.) =  21.27
  Tc(MIN.) =   30.95
  SUBAREA AREA(ACRES) =    6.70       SUBAREA RUNOFF(CFS) =    0.00
  EFFECTIVE AREA(ACRES) =       8.50      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
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* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
TOTAL AREA(ACRES) =         8.5        PEAK FLOW RATE(CFS) =        0.80
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   1.72
LONGEST FLOWPATH FROM NODE  30300.00 TO NODE  30302.00 =    2512.00 FEET.
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =         8.5  TC(MIN.) =     30.95
EFFECTIVE AREA(ACRES) =      8.50  AREA-AVERAGED Fm(INCH/HR)=  0.60
AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)    =        0.80
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
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********************************************************************************
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              Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                           Analysis prepared by:

                         Michael Baker International
                       5 Hutton Centre Drive Suite 500
                            Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 4A EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 2-YR EV MARCH 2019 CCHIU                                              *
 *************************************************************************

  FILE NAME: X34A02EV.DAT
  TIME/DATE OF STUDY: 14:42 03/25/2019
================================================================================
   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;  0.366
  10)   90.00;  0.300
  11)  120.00;  0.246
  12)  180.00;  0.190
  13)  360.00;  0.136
  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  60.0     30.0     0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30400.00 TO NODE  30401.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
   ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    580.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.150
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.260
   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.)
   AGRICULTURAL POOR COVER
   "ROW CROPS,STRAIGHT ROW"   -        0.26      0.60     1.000      0    8.15
   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) =        0.26   PEAK FLOW RATE(CFS) =       0.15

********************************************************************************
   FLOW PROCESS FROM NODE  30401.00 TO NODE  30402.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    580.00  DOWNSTREAM(FEET) =    540.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  220.00    CHANNEL SLOPE = 0.1818
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.129
   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
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.25
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.02
   AVERAGE FLOW DEPTH(FEET) =   0.16    TRAVEL TIME(MIN.) =   1.21
   Tc(MIN.) =    9.36
   SUBAREA AREA(ACRES) =    0.40       SUBAREA RUNOFF(CFS) =    0.19
   EFFECTIVE AREA(ACRES) =       0.65       AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =          0.7          PEAK FLOW RATE(CFS) =       0.31

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =   0.18   FLOW VELOCITY(FEET/SEC.) =   3.19
  LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30402.00 =    536.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  30402.00 TO NODE  30403.00 IS CODE =  51
----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    491.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  151.00   CHANNEL SLOPE = 0.3245
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.065
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap       SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED              -        0.12     0.60      1.000      -
  USER-DEFINED              -        0.86     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) =      0.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.26
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   0.59
  Tc(MIN.) =   9.95
  SUBAREA AREA(ACRES) =     0.98     SUBAREA RUNOFF(CFS) =    0.41
  EFFECTIVE AREA(ACRES) =      1.63      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.6          PEAK FLOW RATE(CFS) =        0.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =   0.22   FLOW VELOCITY(FEET/SEC.) =   4.78
  LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30403.00 =    687.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  30403.00 TO NODE  30404.00 IS CODE =  51
----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    491.00  DOWNSTREAM(FEET) =    473.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  170.00   CHANNEL SLOPE = 0.1059
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 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              -        1.00     0.60      1.000      -
  USER-DEFINED              -        1.00     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) =      1.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.40
  AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   0.83
  Tc(MIN.) =  10.79
  SUBAREA AREA(ACRES) =     2.00     SUBAREA RUNOFF(CFS) =    0.77
  EFFECTIVE AREA(ACRES) =       3.63      AREA-AVERAGED Fm(INCH/HR) =   0.60
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```
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.6          PEAK FLOW RATE(CFS) =        1.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =   0.36   FLOW VELOCITY(FEET/SEC.) =   3.67
  LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30404.00 =    857.00 FEET.


***************************************************************************
  FLOW PROCESS FROM NODE  30404.00 TO NODE  30405.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    473.00  DOWNSTREAM(FEET) =    430.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  289.00   CHANNEL SLOPE = 0.1488
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 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              -       20.80     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) =      5.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.78
  AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   0.83
  Tc(MIN.) =  11.62
  SUBAREA AREA(ACRES) =    20.80     SUBAREA RUNOFF(CFS) =    7.28
  EFFECTIVE AREA(ACRES) =      24.43      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       24.4          PEAK FLOW RATE(CFS) =        8.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =   0.66   FLOW VELOCITY(FEET/SEC.) =   6.56
  LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30405.00 =   1146.00 FEET.
========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =        24.4  TC(MIN.) =      11.62
  EFFECTIVE AREA(ACRES) =      24.43  AREA-AVERAGED Fm(INCH/HR)=  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)     =         8.55
========================================================================
========================================================================

  END OF RATIONAL METHOD ANALYSIS
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_____
******************************************************************
        RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                     Analysis prepared by:

                   Michael Baker International
                  5 Hutton Centre Drive Suite 500
                      Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 4B EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 2-YR EV MARCH 2019 CCHIU                                             *
 **********************************************************************

  FILE NAME: X34B02EV.DAT
  TIME/DATE OF STUDY: 14:54 03/25/2019
===================================================================
   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;  0.366
  10)   90.00;  0.300
  11)  120.00;  0.246
  12)  180.00;  0.190
  13)  360.00;  0.136
  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  60.0    30.0      0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30410.00 TO NODE  30411.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
  ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    558.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.546
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.325
  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.)
  AGRICULTURAL POOR COVER
  "ROW CROPS,STRAIGHT ROW"  -        0.59     0.60     1.000     0   7.55
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.39
  TOTAL AREA(ACRES) =       0.59   PEAK FLOW RATE(CFS) =       0.39


****************************************************************************
  FLOW PROCESS FROM NODE  30411.00 TO NODE  30412.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    558.00  DOWNSTREAM(FEET) =    534.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   137.00   CHANNEL SLOPE = 0.1752
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.257
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        0.85     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) =       0.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.64
  AVERAGE FLOW DEPTH(FEET) =  0.24   TRAVEL TIME(MIN.) =   0.63
  Tc(MIN.) =   8.17
  SUBAREA AREA(ACRES) =    0.85      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =     1.44      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       1.4        PEAK FLOW RATE(CFS) =       0.85

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.27    FLOW VELOCITY(FEET/SEC.) =   3.89
    LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30412.00 =    464.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  30412.00 TO NODE  30413.00 IS CODE = 51
   -------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ===================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    534.00  DOWNSTREAM(FEET) =    504.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   204.00   CHANNEL SLOPE = 0.1471
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.166
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED            -         1.59     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) =       1.26
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.01
   AVERAGE FLOW DEPTH(FEET) =   0.32    TRAVEL TIME(MIN.) =   0.85
   Tc(MIN.) =    9.02
   SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =    0.81
   EFFECTIVE AREA(ACRES) =     3.02     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) =       1.54

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.35    FLOW VELOCITY(FEET/SEC.) =   4.28
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30413.00 =    668.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  30413.00 TO NODE  30414.00 IS CODE = 51
   -------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ===================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    504.00  DOWNSTREAM(FEET) =    472.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE = 0.1296
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 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            -         3.99     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) =       2.38
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.57
   AVERAGE FLOW DEPTH(FEET) =   0.42    TRAVEL TIME(MIN.) =   0.90
   Tc(MIN.) =    9.92
   SUBAREA AREA(ACRES) =     3.99      SUBAREA RUNOFF(CFS) =    1.68
   EFFECTIVE AREA(ACRES) =     7.01     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       7.0         PEAK FLOW RATE(CFS) =       2.96
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.45    FLOW VELOCITY(FEET/SEC.) =   4.80
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30414.00 =    915.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  30414.00 TO NODE  30415.00 IS CODE = 51
   -------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ===================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    472.00  DOWNSTREAM(FEET) =    447.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   345.00   CHANNEL SLOPE = 0.0725
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.003
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED            -         6.31     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) =       4.10
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.22
   AVERAGE FLOW DEPTH(FEET) =   0.57    TRAVEL TIME(MIN.) =   1.36
   Tc(MIN.) =   11.29
   SUBAREA AREA(ACRES) =     6.31      SUBAREA RUNOFF(CFS) =    2.29
   EFFECTIVE AREA(ACRES) =    13.32     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      13.3         PEAK FLOW RATE(CFS) =       4.84

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.61    FLOW VELOCITY(FEET/SEC.) =   4.37
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30415.00 =   1260.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  30415.00 TO NODE  30416.00 IS CODE = 51
   -------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ===================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =    403.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   781.00   CHANNEL SLOPE = 0.0563
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.868
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED            -        11.95     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) =       6.31
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.23
   AVERAGE FLOW DEPTH(FEET) =   0.70    TRAVEL TIME(MIN.) =   3.08
   Tc(MIN.) =   14.36
   SUBAREA AREA(ACRES) =    11.95      SUBAREA RUNOFF(CFS) =    2.88
   EFFECTIVE AREA(ACRES) =    25.27     AREA-AVERAGED Fm(INCH/HR) =   0.60
```

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  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      25.3        PEAK FLOW RATE(CFS) =       6.10


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.70   FLOW VELOCITY(FEET/SEC.) =   4.18
  LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30416.00 =   2041.00 FEET.


**************************************************************************
  FLOW PROCESS FROM NODE  30416.00 TO NODE  30417.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     403.00  DOWNSTREAM(FEET) =     387.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    383.00   CHANNEL SLOPE = 0.0418
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   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               -         2.70      0.60      1.000      -
  USER-DEFINED               -         2.80      0.60      1.000      -
  USER-DEFINED               -         2.90      0.60      1.000      -
  USER-DEFINED               -         0.90      0.60      1.000      -
  USER-DEFINED               -         0.10      0.60      1.000      -
  USER-DEFINED               -         3.20      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) =      7.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.93
  AVERAGE FLOW DEPTH(FEET) =   0.79    TRAVEL TIME(MIN.) =   1.62
  Tc(MIN.) =   15.99
  SUBAREA AREA(ACRES) =   12.60        SUBAREA RUNOFF(CFS) =    2.45
  EFFECTIVE AREA(ACRES) =      37.87     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      37.9        PEAK FLOW RATE(CFS) =       7.38


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.79   FLOW VELOCITY(FEET/SEC.) =   3.95
  LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30417.00 =   2424.00 FEET.


**************************************************************************
  FLOW PROCESS FROM NODE  30417.00 TO NODE  30417.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   15.99
  *   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               -         0.60      0.60      1.000      -
  USER-DEFINED               -         0.10      0.60      1.000      -
  USER-DEFINED               -         0.70      0.60      1.000      -
  USER-DEFINED               -         0.20      0.60      1.000      -
  USER-DEFINED               -         0.90      0.60      1.000      -
  USER-DEFINED               -         0.10      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) =   2.60       SUBAREA RUNOFF(CFS) =    0.51
  EFFECTIVE AREA(ACRES) =      40.47    AREA-AVERAGED Fm(INCH/HR) = 0.60
  AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =       40.5        PEAK FLOW RATE(CFS) =       7.89


**************************************************************************
  FLOW PROCESS FROM NODE  30417.00 TO NODE  30417.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   15.99
  *   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               -         0.30      0.60      1.000      -
  USER-DEFINED               -         0.30      0.60      1.000      -
  USER-DEFINED               -         0.10      0.60      1.000      -
  USER-DEFINED               -         0.10      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) =   1.50       SUBAREA RUNOFF(CFS) =    0.29
  EFFECTIVE AREA(ACRES) =      41.97    AREA-AVERAGED Fm(INCH/HR) = 0.60
  AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =       42.0        PEAK FLOW RATE(CFS) =       8.18
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       42.0   TC(MIN.) =      15.99
  EFFECTIVE AREA(ACRES) =      41.97  AREA-AVERAGED Fm(INCH/HR)=  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       8.18
==========================================================================
==========================================================================
  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 **************************
 * RMV PA-3 WATERSHED 5A EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 2-YR EV MARCH 2019 CCHIU                                             *
 ************************************************************************

  FILE NAME: X35A02EV.DAT
  TIME/DATE OF STUDY: 15:00 03/25/2019
=================================================================================
   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; 0.366
  10)   90.00; 0.300
  11)  120.00; 0.246
  12)  180.00; 0.190
  13)  360.00; 0.136
  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  60.0     30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0     25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0     20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0     15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0     10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30500.00 TO NODE  30501.00 IS CODE =  21
-------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  303.00
  ELEVATION DATA: UPSTREAM(FEET) =   769.00  DOWNSTREAM(FEET) =   695.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.201
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.146
  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"              -        1.01     0.60     1.000     0   9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =       0.50
  TOTAL AREA(ACRES) =       1.01   PEAK FLOW RATE(CFS) =       0.50


*************************************************************************
  FLOW PROCESS FROM NODE  30501.00 TO NODE  30502.00 IS CODE =  51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.00  DOWNSTREAM(FEET) =   665.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  167.00   CHANNEL SLOPE = 0.1796
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.066
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
      LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -       0.89     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) =       0.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.73
  AVERAGE FLOW DEPTH(FEET) =  0.25   TRAVEL TIME(MIN.) =   0.75
  Tc(MIN.) =    9.95
  SUBAREA AREA(ACRES) =     0.89       SUBAREA RUNOFF(CFS) =    0.37
  EFFECTIVE AREA(ACRES) =      1.89      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       1.9          PEAK FLOW RATE(CFS) =       0.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.26    FLOW VELOCITY(FEET/SEC.) =   3.85
  LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30502.00 =     470.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  30502.00 TO NODE  30503.00 IS CODE = 51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    665.00  DOWNSTREAM(FEET) =     645.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE = 0.1818
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.043
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.98      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) =       0.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.22
  AVERAGE FLOW DEPTH(FEET) =  0.28    TRAVEL TIME(MIN.) =   0.43
  Tc(MIN.) =   10.38
  SUBAREA AREA(ACRES) =      0.98      SUBAREA RUNOFF(CFS) =    0.39
  EFFECTIVE AREA(ACRES) =     2.88      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.9         PEAK FLOW RATE(CFS) =       1.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.30    FLOW VELOCITY(FEET/SEC.) =   4.24
  LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30503.00 =     580.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  30503.00 TO NODE  30504.00 IS CODE = 51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =     630.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   152.00   CHANNEL SLOPE = 0.0987
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.014
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        3.30      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) =       1.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.83
  AVERAGE FLOW DEPTH(FEET) =  0.39    TRAVEL TIME(MIN.) =   0.66
  Tc(MIN.) =   11.04
  SUBAREA AREA(ACRES) =      3.30      SUBAREA RUNOFF(CFS) =    1.23
  EFFECTIVE AREA(ACRES) =     6.18      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        6.2         PEAK FLOW RATE(CFS) =       2.30
```

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  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43    FLOW VELOCITY(FEET/SEC.) =   4.11
  LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30504.00 =     732.00 FEET.


***************************************************************************
  FLOW PROCESS FROM NODE  30504.00 TO NODE  30505.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =     600.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   329.00   CHANNEL SLOPE = 0.0912
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.959
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        7.11      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) =       3.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.36
  AVERAGE FLOW DEPTH(FEET) =  0.51    TRAVEL TIME(MIN.) =   1.26
  Tc(MIN.) =   12.30
  SUBAREA AREA(ACRES) =      7.11      SUBAREA RUNOFF(CFS) =    2.30
  EFFECTIVE AREA(ACRES) =    13.28      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       13.3         PEAK FLOW RATE(CFS) =       4.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.55    FLOW VELOCITY(FEET/SEC.) =   4.66
  LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30505.00 =    1061.00 FEET.


***************************************************************************
  FLOW PROCESS FROM NODE  30505.00 TO NODE  30506.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =     585.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   297.00   CHANNEL SLOPE = 0.0505
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.904
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       10.71      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) =       5.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.95
  AVERAGE FLOW DEPTH(FEET) =  0.70    TRAVEL TIME(MIN.) =   1.25
  Tc(MIN.) =   13.56
  SUBAREA AREA(ACRES) =     10.71      SUBAREA RUNOFF(CFS) =    2.93
  EFFECTIVE AREA(ACRES) =    24.00      AREA-AVERAGED Fm(INCH/HR) =   0.60
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  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      24.0        PEAK FLOW RATE(CFS) =      6.56

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.73   FLOW VELOCITY(FEET/SEC.) =   4.11
  LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30506.00 =   1358.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30506.00 TO NODE  30507.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     585.00  DOWNSTREAM(FEET) =     550.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    700.00   CHANNEL SLOPE = 0.0500
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.809
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL   AREA       Fp       Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED            -        15.01     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) =      7.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.28
  AVERAGE FLOW DEPTH(FEET) =   0.79   TRAVEL TIME(MIN.) =   2.73
  Tc(MIN.) =   16.28
  SUBAREA AREA(ACRES) =      15.01       SUBAREA RUNOFF(CFS) =     2.83
  EFFECTIVE AREA(ACRES) =      39.01       AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      39.0        PEAK FLOW RATE(CFS) =      7.35

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.76   FLOW VELOCITY(FEET/SEC.) =   4.24
  LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30507.00 =   2058.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30507.00 TO NODE  30508.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     550.00  DOWNSTREAM(FEET) =     500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   1107.00   CHANNEL SLOPE = 0.0452
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.709
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL   AREA       Fp       Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED            -        34.74     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) =      9.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.28
  AVERAGE FLOW DEPTH(FEET) =   0.84   TRAVEL TIME(MIN.) =   4.31
  Tc(MIN.) =   20.59
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  SUBAREA AREA(ACRES) =      34.74       SUBAREA RUNOFF(CFS) =     3.42
  EFFECTIVE AREA(ACRES) =      73.74       AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      73.7        PEAK FLOW RATE(CFS) =      7.35
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.78   FLOW VELOCITY(FEET/SEC.) =   4.07
  LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30508.00 =   3165.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30508.00 TO NODE  30518.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     500.00  DOWNSTREAM(FEET) =     465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    982.00   CHANNEL SLOPE = 0.0356
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.630
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL   AREA       Fp       Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED            -        11.69     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) =      7.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.73
  AVERAGE FLOW DEPTH(FEET) =   0.82   TRAVEL TIME(MIN.) =   4.39
  Tc(MIN.) =   24.98
  SUBAREA AREA(ACRES) =      11.69       SUBAREA RUNOFF(CFS) =     0.32
  EFFECTIVE AREA(ACRES) =      85.43       AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      85.4        PEAK FLOW RATE(CFS) =      7.35
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.81   FLOW VELOCITY(FEET/SEC.) =   3.72
  LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30518.00 =   4147.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30518.00 TO NODE  30518.00 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.) =   24.98
  RAINFALL INTENSITY(INCH/HR) =   0.63
  AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60
  AREA-AVERAGED Ap =   1.00
  EFFECTIVE STREAM AREA(ACRES) =      85.43
  TOTAL STREAM AREA(ACRES) =      85.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.35

***************************************************************************
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  FLOW PROCESS FROM NODE  30510.00 TO NODE  30511.00 IS CODE =  21
-------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    315.00
  ELEVATION DATA: UPSTREAM(FEET) =    792.00  DOWNSTREAM(FEET) =    690.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.832
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.186
  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
  "CHAPARRAL,NARROWLEAF"     -         1.17      0.60      1.000     0    8.83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.62
  TOTAL AREA(ACRES) =       1.17   PEAK FLOW RATE(CFS) =       0.62

*************************************************************************
  FLOW PROCESS FROM NODE  30511.00 TO NODE  30512.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    690.00  DOWNSTREAM(FEET) =    650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    182.00   CHANNEL SLOPE = 0.2198
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.115
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp         Ap      SCS
      LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -         2.22      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) =       1.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.59
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   0.66
  Tc(MIN.) =    9.49
  SUBAREA AREA(ACRES) =     2.22       SUBAREA RUNOFF(CFS) =    1.03
  EFFECTIVE AREA(ACRES) =      3.39     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =      1.57

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   FLOW VELOCITY(FEET/SEC.) =   5.02
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30512.00 =    497.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30512.00 TO NODE  30513.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =    352.00   CHANNEL SLOPE = 0.1136
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.019
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp         Ap      SCS
      LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -         2.07      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) =       1.96
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.10
  AVERAGE FLOW DEPTH(FEET) =   0.40   TRAVEL TIME(MIN.) =   1.43
  Tc(MIN.) =   10.92
  SUBAREA AREA(ACRES) =     2.07       SUBAREA RUNOFF(CFS) =    0.78
  EFFECTIVE AREA(ACRES) =      5.46     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        5.5        PEAK FLOW RATE(CFS) =      2.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   FLOW VELOCITY(FEET/SEC.) =   4.15
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30513.00 =    849.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30513.00 TO NODE  30514.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =    605.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    49.00   CHANNEL SLOPE = 0.1020
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.011
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp         Ap      SCS
      LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -         6.01      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) =       3.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.49
  AVERAGE FLOW DEPTH(FEET) =   0.49   TRAVEL TIME(MIN.) =   0.18
  Tc(MIN.) =   11.11
  SUBAREA AREA(ACRES) =     6.01       SUBAREA RUNOFF(CFS) =    2.23
  EFFECTIVE AREA(ACRES) =     11.47     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       11.5        PEAK FLOW RATE(CFS) =      4.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.54   FLOW VELOCITY(FEET/SEC.) =   4.78
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30514.00 =    898.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30514.00 TO NODE  30515.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   605.00  DOWNSTREAM(FEET) =   600.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   29.00   CHANNEL SLOPE = 0.1724
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.008
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        4.23     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) =      5.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.11
  AVERAGE FLOW DEPTH(FEET) =  0.52   TRAVEL TIME(MIN.) =  0.08
  Tc(MIN.) =   11.18
  SUBAREA AREA(ACRES) =     4.23      SUBAREA RUNOFF(CFS) =    1.55
  EFFECTIVE AREA(ACRES) =    15.71    AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.7        PEAK FLOW RATE(CFS) =       5.77

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.55   FLOW VELOCITY(FEET/SEC.) =  6.31
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30515.00 =    927.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30515.00 TO NODE  30516.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   600.00  DOWNSTREAM(FEET) =   574.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  444.00   CHANNEL SLOPE = 0.0586
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.934
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        6.53     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) =      6.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.41
  AVERAGE FLOW DEPTH(FEET) =  0.71   TRAVEL TIME(MIN.) =  1.68
  Tc(MIN.) =   12.86
  SUBAREA AREA(ACRES) =     6.53      SUBAREA RUNOFF(CFS) =    1.96
  EFFECTIVE AREA(ACRES) =    22.23    AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       22.2        PEAK FLOW RATE(CFS) =       6.69

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.71   FLOW VELOCITY(FEET/SEC.) =  4.37
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30516.00 =   1371.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30516.00 TO NODE  30517.00 IS CODE = 51
---------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   574.00  DOWNSTREAM(FEET) =   519.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1042.00   CHANNEL SLOPE = 0.0528
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.796
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       12.01     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) =      7.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.39
  AVERAGE FLOW DEPTH(FEET) =  0.77   TRAVEL TIME(MIN.) =  3.96
  Tc(MIN.) =   16.82
  SUBAREA AREA(ACRES) =    12.01      SUBAREA RUNOFF(CFS) =    2.12
  EFFECTIVE AREA(ACRES) =    34.24    AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       34.2        PEAK FLOW RATE(CFS) =       6.69
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.73   FLOW VELOCITY(FEET/SEC.) =  4.21
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30517.00 =   2413.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30517.00 TO NODE  30518.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   519.00  DOWNSTREAM(FEET) =   465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1223.00   CHANNEL SLOPE = 0.0442
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.687
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       22.15     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) =      7.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.07
  AVERAGE FLOW DEPTH(FEET) =  0.79   TRAVEL TIME(MIN.) =  5.01
  Tc(MIN.) =   21.83
  SUBAREA AREA(ACRES) =    22.15      SUBAREA RUNOFF(CFS) =    1.74
  EFFECTIVE AREA(ACRES) =    56.39    AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       56.4        PEAK FLOW RATE(CFS) =       6.69
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.75   FLOW VELOCITY(FEET/SEC.) =  3.94
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30518.00 =   3636.00 FEET.
```

```
********************************************************************
   FLOW PROCESS FROM NODE  30518.00 TO NODE  30518.00 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.) =   21.83
   RAINFALL INTENSITY(INCH/HR) =   0.69
   AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =      56.39
   TOTAL STREAM AREA(ACRES) =       56.39
   PEAK FLOW RATE(CFS) AT CONFLUENCE =        6.69

   ** CONFLUENCE DATA **
   STREAM      Q       Tc   Intensity  Fp(Fm)      Ap     Ae    HEADWATER
   NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
     1       7.35    24.98    0.630   0.60( 0.60) 1.00     85.4  30500.00
     2       6.69    21.83    0.687   0.60( 0.60) 1.00     56.4  30510.00

   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      14.03    21.83    0.687   0.60( 0.60) 1.00    131.1  30510.00
     2       9.69    24.98    0.630   0.60( 0.60) 1.00    141.8  30500.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      14.03    Tc(MIN.) =    21.83
   EFFECTIVE AREA(ACRES) =     131.07  AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       141.8
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30518.00 =    4147.00 FEET.

********************************************************************
   FLOW PROCESS FROM NODE  30518.00 TO NODE  30519.00 IS CODE =  51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =     448.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    451.00   CHANNEL SLOPE =  0.0377
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.657
   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             -         0.50      0.60      1.000      -
   USER-DEFINED             -         2.40      0.60      0.000      -
   USER-DEFINED             -         2.70      0.60      1.000      -
```

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```
   USER-DEFINED             -         0.10      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 =  0.671
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       14.87
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.51
   AVERAGE FLOW DEPTH(FEET) =  1.05    TRAVEL TIME(MIN.) =   1.67
   Tc(MIN.) =   23.50
   SUBAREA AREA(ACRES) =       7.30       SUBAREA RUNOFF(CFS) =    1.67
   EFFECTIVE AREA(ACRES) =      138.37    AREA-AVERAGED Fm(INCH/HR) =   0.59
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   0.98
   TOTAL AREA(ACRES) =       149.1        PEAK FLOW RATE(CFS) =       14.03
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.03    FLOW VELOCITY(FEET/SEC.) =   4.45
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30519.00 =    4598.00 FEET.

********************************************************************
   FLOW PROCESS FROM NODE  30519.00 TO NODE  30519.00 IS CODE =  81
------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   23.50
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.657
   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             -         0.10      0.60      1.000      -
   USER-DEFINED             -         2.80      0.60      1.000      -
   USER-DEFINED             -         0.20      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) =       3.80       SUBAREA RUNOFF(CFS) =    0.20
   EFFECTIVE AREA(ACRES) =      142.17    AREA-AVERAGED Fm(INCH/HR) =   0.59
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   0.98
   TOTAL AREA(ACRES) =       152.9        PEAK FLOW RATE(CFS) =       14.03
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
=========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =      152.9  TC(MIN.) =      23.50
   EFFECTIVE AREA(ACRES)  =      142.17  AREA-AVERAGED Fm(INCH/HR)=  0.59
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 0.983
   PEAK FLOW RATE(CFS)    =       14.03

   ** PEAK FLOW RATE TABLE **
   STREAM      Q       Tc   Intensity  Fp(Fm)      Ap     Ae    HEADWATER
   NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
     1      14.03    23.50    0.657   0.60( 0.59) 0.98    142.2  30510.00
     2       9.69    26.79    0.605   0.60( 0.59) 0.98    152.9  30500.00
=========================================================================
=========================================================================
   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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           Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                       Analysis prepared by:

                    Michael Baker International
                   5 Hutton Centre Drive Suite 500
                       Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 5B EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 2-YR EV MARCH 2019 CCHIU                                            *
 **********************************************************************

  FILE NAME: X35B02EV.DAT
  TIME/DATE OF STUDY: 15:20 03/25/2019
 ========================================================================
   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;  0.366
  10)   90.00;  0.300
  11)  120.00;  0.246
  12)  180.00;  0.190
  13)  360.00;  0.136
  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  60.0    30.0    0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30530.00 TO NODE  30531.00 IS CODE =  21
 ------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   318.00
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =    605.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.088
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.159
  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
  "CHAPARRAL,BROADLEAF"      -       0.05     0.60     1.000     0    9.09
  NATURAL FAIR COVER
  "OPEN BRUSH"              -       0.48     0.60     1.000     0    9.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.27
  TOTAL AREA(ACRES) =       0.53   PEAK FLOW RATE(CFS) =      0.27


 **********************************************************************
  FLOW PROCESS FROM NODE  30531.00 TO NODE  30532.00 IS CODE =  51
 ------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   605.00  DOWNSTREAM(FEET) =    575.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   123.00   CHANNEL SLOPE = 0.2439
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.100
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap     SCS
     LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
  USER-DEFINED               -       0.25     0.60     1.000     -
  USER-DEFINED               -       0.62     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) =       0.46
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.81
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =    0.54
  Tc(MIN.) =     9.63
  SUBAREA AREA(ACRES) =      0.87      SUBAREA RUNOFF(CFS) =      0.39
  EFFECTIVE AREA(ACRES) =       1.40     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
```

```
   TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =        0.63


   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.23   FLOW VELOCITY(FEET/SEC.) =   4.12
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30532.00 =     441.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30532.00 TO NODE  30533.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    575.00 DOWNSTREAM(FEET) =     565.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    67.00   CHANNEL SLOPE = 0.1493
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
   *  2 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               -       0.45      0.60      1.000     -
   USER-DEFINED               -       0.47      0.60      1.000     -
   USER-DEFINED               -       0.01      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) =        0.83
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.73
   AVERAGE FLOW DEPTH(FEET) =   0.27   TRAVEL TIME(MIN.) =   0.30
   Tc(MIN.) =   9.92
   SUBAREA AREA(ACRES) =      0.93        SUBAREA RUNOFF(CFS) =    0.39
   EFFECTIVE AREA(ACRES) =      2.33      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =        0.98

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.29   FLOW VELOCITY(FEET/SEC.) =   3.82
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30533.00 =     508.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30533.00 TO NODE  30534.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    565.00 DOWNSTREAM(FEET) =     540.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   172.00   CHANNEL SLOPE = 0.1453
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.033
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -       0.01      0.60      1.000     -
   USER-DEFINED               -       0.65      0.60      1.000     -
   USER-DEFINED               -       0.52      0.60      1.000     -
   USER-DEFINED               -       0.36      0.60      1.000     -
   USER-DEFINED               -       0.01      0.60      1.000     -
   USER-DEFINED               -       0.34      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) =        1.35
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.11
   AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   0.70
   Tc(MIN.) =   10.62
   SUBAREA AREA(ACRES) =      1.89        SUBAREA RUNOFF(CFS) =    0.74
   EFFECTIVE AREA(ACRES) =      4.22      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) =        1.64

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.36   FLOW VELOCITY(FEET/SEC.) =   4.33
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30534.00 =     680.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30534.00 TO NODE  30535.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    540.00 DOWNSTREAM(FEET) =     510.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   302.00   CHANNEL SLOPE = 0.0993
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.977
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -       0.58      0.60      1.000     -
   USER-DEFINED               -       0.16      0.60      1.000     -
   USER-DEFINED               -       0.03      0.60      1.000     -
   USER-DEFINED               -       1.37      0.60      1.000     -
   USER-DEFINED               -       0.22      0.60      1.000     -
   USER-DEFINED               -       0.41      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) =        2.11
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.95
   AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =   1.27
   Tc(MIN.) =   11.90
   SUBAREA AREA(ACRES) =      2.77        SUBAREA RUNOFF(CFS) =    0.94
   EFFECTIVE AREA(ACRES) =      6.99      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        7.0        PEAK FLOW RATE(CFS) =        2.37

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.44   FLOW VELOCITY(FEET/SEC.) =   4.12
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30535.00 =     982.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30535.00 TO NODE  30535.00 IS CODE = 81
----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   MAINLINE Tc(MIN.) =   11.90
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.977
   SUBAREA LOSS RATE DATA(AMC II):
```

```
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       0.36     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) =    0.36      SUBAREA RUNOFF(CFS) =    0.12
   EFFECTIVE AREA(ACRES) =      7.35   AREA-AVERAGED Fm(INCH/HR) = 0.60
   AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        7.3        PEAK FLOW RATE(CFS) =      2.49

*****************************************************************************
   FLOW PROCESS FROM NODE  30535.00 TO NODE  30536.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    510.00  DOWNSTREAM(FEET) =     490.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   356.00   CHANNEL SLOPE = 0.0562
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.904
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       0.85     0.60      1.000     -
   USER-DEFINED              -       0.32     0.60      1.000     -
   USER-DEFINED              -       0.09     0.60      1.000     -
   USER-DEFINED              -       2.69     0.60      1.000     -
   USER-DEFINED              -       0.84     0.60      1.000     -
   USER-DEFINED              -       1.63     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) =       3.38
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.59
   AVERAGE FLOW DEPTH(FEET) =  0.56    TRAVEL TIME(MIN.) =   1.65
   Tc(MIN.) =   13.55
   SUBAREA AREA(ACRES) =    6.42      SUBAREA RUNOFF(CFS) =    1.76
   EFFECTIVE AREA(ACRES) =     13.77    AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        13.8        PEAK FLOW RATE(CFS) =       3.77

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.58    FLOW VELOCITY(FEET/SEC.) =  3.70
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30536.00 =   1338.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  30536.00 TO NODE  30536.00 IS CODE = 81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   MAINLINE Tc(MIN.) =   13.55
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.904
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       0.45     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) =    0.45      SUBAREA RUNOFF(CFS) =    0.12
   EFFECTIVE AREA(ACRES) =     14.22   AREA-AVERAGED Fm(INCH/HR) = 0.60
   AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =       14.2        PEAK FLOW RATE(CFS) =      3.89

*****************************************************************************
   FLOW PROCESS FROM NODE  30536.00 TO NODE  30537.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =     455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   556.00   CHANNEL SLOPE = 0.0629
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.820
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       0.49     0.60      1.000     -
   USER-DEFINED              -       2.10     0.60      1.000     -
   USER-DEFINED              -       0.33     0.60      1.000     -
   USER-DEFINED              -       0.39     0.60      1.000     -
   USER-DEFINED              -       3.76     0.60      1.000     -
   USER-DEFINED              -       0.02     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) =       4.60
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.08
   AVERAGE FLOW DEPTH(FEET) =  0.61    TRAVEL TIME(MIN.) =   2.27
   Tc(MIN.) =   15.82
   SUBAREA AREA(ACRES) =    7.09      SUBAREA RUNOFF(CFS) =    1.41
   EFFECTIVE AREA(ACRES) =     21.31    AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        21.3        PEAK FLOW RATE(CFS) =       4.23

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.59    FLOW VELOCITY(FEET/SEC.) =  4.02
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30537.00 =   1894.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  30537.00 TO NODE  30537.00 IS CODE = 81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   MAINLINE Tc(MIN.) =   15.82
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.820
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       0.49     0.60      1.000     -
   USER-DEFINED              -       3.83     0.60      1.000     -
   USER-DEFINED              -       0.39     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) =    4.71      SUBAREA RUNOFF(CFS) =    0.93
   EFFECTIVE AREA(ACRES) =     26.02   AREA-AVERAGED Fm(INCH/HR) = 0.60
   AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
```

```
   TOTAL AREA(ACRES) =        26.0      PEAK FLOW RATE(CFS) =        5.16


*****************************************************************************
  FLOW PROCESS FROM NODE  30537.00 TO NODE  30538.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    417.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   569.00   CHANNEL SLOPE =  0.0668
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.773
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap     SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       35.49     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) =       7.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.80
  AVERAGE FLOW DEPTH(FEET) =   0.74   TRAVEL TIME(MIN.) =   1.98
  Tc(MIN.) =   17.80
  SUBAREA AREA(ACRES) =     35.49      SUBAREA RUNOFF(CFS) =    5.52
  EFFECTIVE AREA(ACRES) =      61.51     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        61.5       PEAK FLOW RATE(CFS) =       9.57

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.80   FLOW VELOCITY(FEET/SEC.) =   5.03
  LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30538.00 =    2463.00 FEET.
===========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)    =        61.5  TC(MIN.) =      17.80
  EFFECTIVE AREA(ACRES) =       61.51  AREA-AVERAGED Fm(INCH/HR)=   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =        9.57
===========================================================================
===========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
*********************************************************************
       RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
       (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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          Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                     Analysis prepared by:

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                      Santa Ana, CA92707


  ************************** DESCRIPTION OF STUDY **********************
 * RMV PA-3 WATERSHED 5C EXISTING CONDITION                          *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                             *
 * 2-YR EV MARCH 2019 CCHIU                                          *
  ********************************************************************

  FILE NAME: X35C02EV.DAT
  TIME/DATE OF STUDY: 15:28 03/25/2019
========================================================================
  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; 0.366
  10)   90.00; 0.300
  11)  120.00; 0.246
  12)  180.00; 0.190
  13)  360.00; 0.136
  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  60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  30550.00 TO NODE  30551.00 IS CODE =  21
 ----------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =====================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  330.00
   ELEVATION DATA: UPSTREAM(FEET) =   865.00  DOWNSTREAM(FEET) =   700.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   8.249
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.249
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS   Tc
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN  (MIN.)
   NATURAL FAIR COVER
   "CHAPARRAL,BROADLEAF"     -       1.55     0.60     1.000     0   8.25
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.90
   TOTAL AREA(ACRES) =       1.55   PEAK FLOW RATE(CFS) =       0.90


 ***********************************************************************
   FLOW PROCESS FROM NODE  30551.00 TO NODE  30552.00 IS CODE =  51
 ----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   685.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  304.00   CHANNEL SLOPE = 0.0493
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.055
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       1.49     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) =       1.21
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.70
   AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   1.87
   Tc(MIN.) =   10.12
   SUBAREA AREA(ACRES) =    1.49       SUBAREA RUNOFF(CFS) =    0.61
   EFFECTIVE AREA(ACRES) =      3.03     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) =      1.24

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
     DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   2.69
     LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30552.00 =     634.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30552.00 TO NODE  30553.00 IS CODE =  51
   ------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ==================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    685.00  DOWNSTREAM(FEET) =    650.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    84.00   CHANNEL SLOPE = 0.4167
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.045
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -        3.11      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) =       1.87
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.55
   AVERAGE FLOW DEPTH(FEET) =   0.31   TRAVEL TIME(MIN.) =   0.21
   Tc(MIN.) =   10.34
   SUBAREA AREA(ACRES) =     3.11      SUBAREA RUNOFF(CFS) =    1.25
   EFFECTIVE AREA(ACRES) =      6.15     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) =       2.46

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =   7.08
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30553.00 =     718.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30553.00 TO NODE  30554.00 IS CODE =  51
   ------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ==================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    620.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   370.00   CHANNEL SLOPE = 0.0811
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.978
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -        3.21      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) =       3.01
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.03
   AVERAGE FLOW DEPTH(FEET) =   0.50   TRAVEL TIME(MIN.) =   1.53
   Tc(MIN.) =   11.87
   SUBAREA AREA(ACRES) =     3.21      SUBAREA RUNOFF(CFS) =    1.09
   EFFECTIVE AREA(ACRES) =      9.35     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        9.4        PEAK FLOW RATE(CFS) =       3.18
```

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   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   4.10
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30554.00 =    1088.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  30554.00 TO NODE  30555.00 IS CODE =  51
   --------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =    604.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   151.00   CHANNEL SLOPE = 0.1060
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.957
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -       14.25      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) =       5.47
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.20
   AVERAGE FLOW DEPTH(FEET) =   0.59   TRAVEL TIME(MIN.) =   0.48
   Tc(MIN.) =   12.35
   SUBAREA AREA(ACRES) =    14.25      SUBAREA RUNOFF(CFS) =    4.57
   EFFECTIVE AREA(ACRES) =     23.60     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       23.6        PEAK FLOW RATE(CFS) =       7.58

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.67   FLOW VELOCITY(FEET/SEC.) =   5.65
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30555.00 =    1239.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  30555.00 TO NODE  30556.00 IS CODE =  51
   --------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    604.00  DOWNSTREAM(FEET) =    543.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1099.00   CHANNEL SLOPE = 0.0555
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.811
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -       23.90      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) =       9.88
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.73
   AVERAGE FLOW DEPTH(FEET) =   0.83   TRAVEL TIME(MIN.) =   3.87
   Tc(MIN.) =   16.23
   SUBAREA AREA(ACRES) =    23.90      SUBAREA RUNOFF(CFS) =    4.53
   EFFECTIVE AREA(ACRES) =     47.50     AREA-AVERAGED Fm(INCH/HR) =   0.60
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      47.5        PEAK FLOW RATE(CFS) =       9.01

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.81  FLOW VELOCITY(FEET/SEC.) =  4.62
 LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30556.00 =   2338.00 FEET.

************************************************************************
 FLOW PROCESS FROM NODE  30556.00 TO NODE  30557.00 IS CODE =  51
-----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    543.00  DOWNSTREAM(FEET) =    503.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1074.00   CHANNEL SLOPE = 0.0372
 CHANNEL BASE(FEET) =   0.00  "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.709
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp       Ap       SCS
      LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        23.19     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) =     10.17
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.09
 AVERAGE FLOW DEPTH(FEET) =  0.91   TRAVEL TIME(MIN.) =   4.38
 Tc(MIN.) =  20.61
 SUBAREA AREA(ACRES) =     23.19       SUBAREA RUNOFF(CFS) =    2.28
 EFFECTIVE AREA(ACRES) =     70.69      AREA-AVERAGED Fm(INCH/HR) =   0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      70.7        PEAK FLOW RATE(CFS) =       9.01
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.87  FLOW VELOCITY(FEET/SEC.) =  4.00
 LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30557.00 =   3412.00 FEET.

************************************************************************
 FLOW PROCESS FROM NODE  30557.00 TO NODE  30558.00 IS CODE =  51
-----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    503.00  DOWNSTREAM(FEET) =    460.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1155.00   CHANNEL SLOPE = 0.0372
 CHANNEL BASE(FEET) =   0.00  "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.625
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp       Ap       SCS
      LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        59.03     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) =      9.80
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.06
 AVERAGE FLOW DEPTH(FEET) =  0.90   TRAVEL TIME(MIN.) =   4.75
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 Tc(MIN.) =  25.35
 SUBAREA AREA(ACRES) =     59.03       SUBAREA RUNOFF(CFS) =    1.34
 EFFECTIVE AREA(ACRES) =    129.73      AREA-AVERAGED Fm(INCH/HR) =   0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =     129.7        PEAK FLOW RATE(CFS) =       9.01
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.87  FLOW VELOCITY(FEET/SEC.) =  4.00
 LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30558.00 =   4567.00 FEET.

************************************************************************
 FLOW PROCESS FROM NODE  30558.00 TO NODE  30559.00 IS CODE =  51
-----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    399.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1322.00   CHANNEL SLOPE = 0.0461
 CHANNEL BASE(FEET) =   0.00  "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.556
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp       Ap       SCS
      LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        45.38     0.60     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      9.01
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.31
 AVERAGE FLOW DEPTH(FEET) =  0.83   TRAVEL TIME(MIN.) =   5.11
 Tc(MIN.) =  30.46
 SUBAREA AREA(ACRES) =     45.38       SUBAREA RUNOFF(CFS) =    0.00
 EFFECTIVE AREA(ACRES) =    175.11      AREA-AVERAGED Fm(INCH/HR) =   0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) =     175.1        PEAK FLOW RATE(CFS) =       9.01
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.83  FLOW VELOCITY(FEET/SEC.) =  4.31
 LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30559.00 =   5889.00 FEET.

************************************************************************
 FLOW PROCESS FROM NODE  30559.00 TO NODE  30560.00 IS CODE =  51
-----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    399.00  DOWNSTREAM(FEET) =    375.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  373.00   CHANNEL SLOPE = 0.0643
 CHANNEL BASE(FEET) =   0.00  "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.546
 SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp          Ap      SCS
     LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED               -        12.10      0.60       1.000      -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      9.01
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.90
 AVERAGE FLOW DEPTH(FEET) =   0.78   TRAVEL TIME(MIN.) =   1.27
 Tc(MIN.) =   31.73
 SUBAREA AREA(ACRES) =    12.10       SUBAREA RUNOFF(CFS) =    0.00
 EFFECTIVE AREA(ACRES) =     187.21     AREA-AVERAGED Fm(INCH/HR) =   0.60
 AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) =      187.2        PEAK FLOW RATE(CFS) =       9.01
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.78   FLOW VELOCITY(FEET/SEC.) =   4.90
 LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30560.00 =    6262.00 FEET.
==============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =      187.2  TC(MIN.) =      31.73
 EFFECTIVE AREA(ACRES) =     187.21  AREA-AVERAGED Fm(INCH/HR)=  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =        9.01
==============================================================================
==============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

                      Michael Baker International
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                         Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 5D EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 2-YR EV MARCH 2019 CCHIU                                             *
 ************************************************************************

  FILE NAME: X35D02EV.DAT
  TIME/DATE OF STUDY: 15:32 03/25/2019
================================================================================
  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;  0.366
  10)   90.00;  0.300
  11)  120.00;  0.246
  12)  180.00;  0.190
  13)  360.00;  0.136
  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  60.0     30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30520.00 TO NODE  30521.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   315.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    692.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.937
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.283
  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
  "CHAPARRAL,BROADLEAF"     -        1.83     0.60     1.000     0   7.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       1.12
  TOTAL AREA(ACRES) =       1.83   PEAK FLOW RATE(CFS) =       1.12


********************************************************************************
  FLOW PROCESS FROM NODE  30521.00 TO NODE  30522.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    692.00  DOWNSTREAM(FEET) =    670.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   148.00   CHANNEL SLOPE = 0.1486
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.219
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap      SCS
      LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        0.75     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) =       1.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.20
  AVERAGE FLOW DEPTH(FEET) =   0.33    TRAVEL TIME(MIN.) =   0.59
  Tc(MIN.) =    8.53
  SUBAREA AREA(ACRES) =     0.75       SUBAREA RUNOFF(CFS) =    0.42
  EFFECTIVE AREA(ACRES) =     2.57       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) =       1.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =   4.17
LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30522.00 =    463.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  30522.00 TO NODE  30523.00 IS CODE = 51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    670.00  DOWNSTREAM(FEET) =    654.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  104.00   CHANNEL SLOPE = 0.1538
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.178
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -         1.72     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) =      1.88
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.56
  AVERAGE FLOW DEPTH(FEET) =  0.37   TRAVEL TIME(MIN.) =  0.38
  Tc(MIN.) =   8.91
  SUBAREA AREA(ACRES) =    1.72      SUBAREA RUNOFF(CFS) =   0.89
  EFFECTIVE AREA(ACRES) =    4.29     AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =      4.3        PEAK FLOW RATE(CFS) =     2.23

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   4.80
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30523.00 =    567.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  30523.00 TO NODE  30524.00 IS CODE = 51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    654.00  DOWNSTREAM(FEET) =    615.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  378.00   CHANNEL SLOPE = 0.1032
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.045
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -         3.19     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) =      2.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.37
  AVERAGE FLOW DEPTH(FEET) =  0.47   TRAVEL TIME(MIN.) =  1.44
  Tc(MIN.) =  10.35
  SUBAREA AREA(ACRES) =    3.19      SUBAREA RUNOFF(CFS) =   1.28
  EFFECTIVE AREA(ACRES) =    7.48     AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =      7.5        PEAK FLOW RATE(CFS) =     3.00
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOW VELOCITY(FEET/SEC.) =   4.41
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30524.00 =    945.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30524.00 TO NODE  30525.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    593.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  190.00   CHANNEL SLOPE = 0.1158
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   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             -         6.94     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) =      4.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.08
  AVERAGE FLOW DEPTH(FEET) =  0.53   TRAVEL TIME(MIN.) =  0.62
  Tc(MIN.) =  10.97
  SUBAREA AREA(ACRES) =    6.94      SUBAREA RUNOFF(CFS) =   2.61
  EFFECTIVE AREA(ACRES) =   14.42     AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =     14.4        PEAK FLOW RATE(CFS) =     5.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   5.32
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30525.00 =   1135.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30525.00 TO NODE  30526.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    593.00  DOWNSTREAM(FEET) =    545.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  642.00   CHANNEL SLOPE = 0.0748
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.920
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -         9.38     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) =      6.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.83
  AVERAGE FLOW DEPTH(FEET) =  0.68   TRAVEL TIME(MIN.) =  2.22
  Tc(MIN.) =  13.19
  SUBAREA AREA(ACRES) =    9.38      SUBAREA RUNOFF(CFS) =   2.70
  EFFECTIVE AREA(ACRES) =   23.80     AREA-AVERAGED Fm(INCH/HR) =  0.60
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      23.8        PEAK FLOW RATE(CFS) =       6.85

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.69   FLOW VELOCITY(FEET/SEC.) =   4.80
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30526.00 =   1777.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30526.00 TO NODE  30527.00 IS CODE =  51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =     483.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1032.00   CHANNEL SLOPE = 0.0601
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.796
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       21.43     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) =      8.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.70
  AVERAGE FLOW DEPTH(FEET) =   0.79   TRAVEL TIME(MIN.) =   3.66
  Tc(MIN.) =   16.85
  SUBAREA AREA(ACRES) =    21.43       SUBAREA RUNOFF(CFS) =    3.78
  EFFECTIVE AREA(ACRES) =    45.23     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      45.2        PEAK FLOW RATE(CFS) =       7.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.76   FLOW VELOCITY(FEET/SEC.) =   4.60
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30527.00 =   2809.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30527.00 TO NODE  30528.00 IS CODE =  51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    483.00  DOWNSTREAM(FEET) =     456.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  473.00   CHANNEL SLOPE = 0.0571
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.755
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       11.90     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) =      8.80
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.63
  AVERAGE FLOW DEPTH(FEET) =   0.80   TRAVEL TIME(MIN.) =   1.70
  Tc(MIN.) =   18.55
```

```
  SUBAREA AREA(ACRES) =     11.90       SUBAREA RUNOFF(CFS) =    1.66
  EFFECTIVE AREA(ACRES) =    57.13      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      57.1        PEAK FLOW RATE(CFS) =       7.97
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.77   FLOW VELOCITY(FEET/SEC.) =   4.53
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30528.00 =   3282.00 FEET.
=============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)        =       57.1  TC(MIN.) =     18.55
  EFFECTIVE AREA(ACRES) =      57.13  AREA-AVERAGED Fm(INCH/HR)=  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  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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                           Santa Ana, CA92707


  ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 6 EXISTING CONDITION                                *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 2-YR EV MARCH 2019 CCHIU                                               *
  *************************************************************************

  FILE NAME: X30602EV.DAT
  TIME/DATE OF STUDY: 06:45 03/26/2019
================================================================================
  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; 0.366
  10)   90.00; 0.300
  11)  120.00; 0.246
  12)  180.00; 0.190
  13)  360.00; 0.136
  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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30600.00 TO NODE  30601.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   328.00
  ELEVATION DATA: UPSTREAM(FEET) =    552.00  DOWNSTREAM(FEET) =    508.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.706
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.029
  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"              -        0.29     0.60     1.000    0   10.71
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =       0.11
  TOTAL AREA(ACRES) =       0.29   PEAK FLOW RATE(CFS) =       0.11

********************************************************************************
  FLOW PROCESS FROM NODE  30601.00 TO NODE  30602.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    508.00  DOWNSTREAM(FEET) =    480.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   176.00   CHANNEL SLOPE = 0.1591
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.976
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS
     LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -       0.29     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) =       0.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.45
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   1.20
  Tc(MIN.) =   11.90
  SUBAREA AREA(ACRES) =     0.29      SUBAREA RUNOFF(CFS) =    0.10
  EFFECTIVE AREA(ACRES) =       0.58      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =      0.20

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.16    FLOW VELOCITY(FEET/SEC.) =   2.65
    LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30602.00 =    504.00 FEET.


*************************************************************************
  FLOW PROCESS FROM NODE  30602.00 TO NODE  30603.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    480.00  DOWNSTREAM(FEET) =     401.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   326.00    CHANNEL SLOPE = 0.2423
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040    MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.907
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp        Ap      SCS
       LAND USE              GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        0.76      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) =       0.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.44
  AVERAGE FLOW DEPTH(FEET) =   0.17    TRAVEL TIME(MIN.) =   1.58
  Tc(MIN.) =   13.48
  SUBAREA AREA(ACRES) =     0.76      SUBAREA RUNOFF(CFS) =    0.21
  EFFECTIVE AREA(ACRES) =     1.34      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) =       0.37

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19    FLOW VELOCITY(FEET/SEC.) =   3.56
  LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30603.00 =    830.00 FEET.


*************************************************************************
  FLOW PROCESS FROM NODE  30603.00 TO NODE  30604.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    401.00  DOWNSTREAM(FEET) =     385.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   106.00    CHANNEL SLOPE = 0.1509
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040    MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.883
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp        Ap      SCS
       LAND USE              GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        0.33      0.60      1.000     -
   USER-DEFINED               -        0.62      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) =       0.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.25
  AVERAGE FLOW DEPTH(FEET) =   0.22    TRAVEL TIME(MIN.) =   0.54
  Tc(MIN.) =   14.03
  SUBAREA AREA(ACRES) =     0.95      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =     2.29      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
```

```
    TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       0.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.24    FLOW VELOCITY(FEET/SEC.) =   3.39
  LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30604.00 =    936.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE = 81
-------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
  MAINLINE Tc(MIN.) =  14.03
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.883
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp        Ap      SCS
       LAND USE              GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        1.27      0.60      1.000     -
   USER-DEFINED               -        0.26      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) =     1.53      SUBAREA RUNOFF(CFS) =    0.39
  EFFECTIVE AREA(ACRES) =     3.82    AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =       0.97

*************************************************************************
  FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE = 81
-------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
  MAINLINE Tc(MIN.) =  14.03
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.883
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp        Ap      SCS
       LAND USE              GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        1.01      0.60      1.000     -
   USER-DEFINED               -        0.29      0.60      1.000     -
   USER-DEFINED               -        0.99      0.60      1.000     -
   USER-DEFINED               -        2.11      0.60      1.000     -
   USER-DEFINED               -        1.41      0.60      1.000     -
   USER-DEFINED               -        0.02      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) =     5.83      SUBAREA RUNOFF(CFS) =    1.48
  EFFECTIVE AREA(ACRES) =     9.65    AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =       2.46

*************************************************************************
  FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE = 81
-------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
  MAINLINE Tc(MIN.) =  14.03
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.883
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp        Ap      SCS
       LAND USE              GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
```

```
USER-DEFINED              -        0.21      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) =    0.21       SUBAREA RUNOFF(CFS) =    0.05
EFFECTIVE AREA(ACRES) =       9.86   AREA-AVERAGED Fm(INCH/HR) =  0.60
AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =         9.9        PEAK FLOW RATE(CFS) =       2.51
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =         9.9  TC(MIN.) =     14.03
EFFECTIVE AREA(ACRES) =      9.86  AREA-AVERAGED Fm(INCH/HR)=  0.60
AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)   =       2.51
================================================================================
================================================================================
END OF RATIONAL METHOD ANALYSIS
```

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

                       Michael Baker International
                      5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
  * RMV PA-3 WATERSHED 7 EXISTING CONDITION                            *
  * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
  * 2-YR EV MARCH 2019 CCHIU                                           *
  **********************************************************************

  FILE NAME: X30702EV.DAT
  TIME/DATE OF STUDY: 06:51 03/26/2019
================================================================================
   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;  0.366
   10)   90.00;  0.300
   11)  120.00;  0.246
   12)  180.00;  0.190
   13)  360.00;  0.136
   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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

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```
  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  30700.00 TO NODE  30701.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  325.00
  ELEVATION DATA: UPSTREAM(FEET) =   760.00  DOWNSTREAM(FEET) =    600.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   8.225
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.252
  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
  "CHAPARRAL,BROADLEAF"     -        1.30      0.60      1.000     0   8.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.77
  TOTAL AREA(ACRES) =        1.30   PEAK FLOW RATE(CFS) =        0.77

****************************************************************************
  FLOW PROCESS FROM NODE  30701.00 TO NODE  30702.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   600.00  DOWNSTREAM(FEET) =    545.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  378.00   CHANNEL SLOPE = 0.1455
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.086
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap     SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        2.43      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) =        1.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.11
  AVERAGE FLOW DEPTH(FEET) =   0.33    TRAVEL TIME(MIN.) =   1.53
  Tc(MIN.) =    9.76
  SUBAREA AREA(ACRES) =    2.43       SUBAREA RUNOFF(CFS) =    1.06
  EFFECTIVE AREA(ACRES) =       3.74      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         3.7         PEAK FLOW RATE(CFS) =        1.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

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```
    DEPTH(FEET) =   0.36    FLOW VELOCITY(FEET/SEC.) =    4.31
    LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30702.00 =     703.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30702.00 TO NODE  30703.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =     539.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    71.00   CHANNEL SLOPE = 0.0845
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.057
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        2.09      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) =       2.06
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.72
   AVERAGE FLOW DEPTH(FEET) =   0.43    TRAVEL TIME(MIN.) =   0.32
   Tc(MIN.) =   10.08
   SUBAREA AREA(ACRES) =      2.09      SUBAREA RUNOFF(CFS) =    0.86
   EFFECTIVE AREA(ACRES) =     5.83     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) =      2.40

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   0.45    FLOW VELOCITY(FEET/SEC.) =    3.89
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30703.00 =     774.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30703.00 TO NODE  30704.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    539.00  DOWNSTREAM(FEET) =     509.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   317.00   CHANNEL SLOPE = 0.0946
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.001
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        2.46      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) =       2.84
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.18
   AVERAGE FLOW DEPTH(FEET) =   0.48    TRAVEL TIME(MIN.) =   1.26
   Tc(MIN.) =   11.34
   SUBAREA AREA(ACRES) =      2.46      SUBAREA RUNOFF(CFS) =    0.89
   EFFECTIVE AREA(ACRES) =     8.29     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =    0.60 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         8.3          PEAK FLOW RATE(CFS) =      2.99
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   0.48    FLOW VELOCITY(FEET/SEC.) =    4.27
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30704.00 =    1091.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  30704.00 TO NODE  30705.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    509.00  DOWNSTREAM(FEET) =     484.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   294.00   CHANNEL SLOPE = 0.0850
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.950
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        2.96      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) =       3.46
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.24
   AVERAGE FLOW DEPTH(FEET) =   0.52    TRAVEL TIME(MIN.) =   1.16
   Tc(MIN.) =   12.50
   SUBAREA AREA(ACRES) =      2.96      SUBAREA RUNOFF(CFS) =    0.93
   EFFECTIVE AREA(ACRES) =    11.25     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) =      3.55

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   0.52    FLOW VELOCITY(FEET/SEC.) =    4.31
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30705.00 =    1385.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  30705.00 TO NODE  30706.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    484.00  DOWNSTREAM(FEET) =     464.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   257.00   CHANNEL SLOPE = 0.0778
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.908
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        7.40      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) =       4.57
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.46
   AVERAGE FLOW DEPTH(FEET) =   0.58    TRAVEL TIME(MIN.) =   0.96
   Tc(MIN.) =   13.46
   SUBAREA AREA(ACRES) =      7.40      SUBAREA RUNOFF(CFS) =    2.05
   EFFECTIVE AREA(ACRES) =    18.66     AREA-AVERAGED Fm(INCH/HR) =   0.60
```

```
AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =        18.7          PEAK FLOW RATE(CFS) =        5.17

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.62   FLOW VELOCITY(FEET/SEC.) =   4.56
LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30706.00 =   1642.00 FEET.

***********************************************************************
  FLOW PROCESS FROM NODE  30706.00 TO NODE  30707.00 IS CODE = 51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    464.00  DOWNSTREAM(FEET) =    455.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   147.00   CHANNEL SLOPE = 0.0612
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.883
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        7.29      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) =      6.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.35
  AVERAGE FLOW DEPTH(FEET) =   0.68   TRAVEL TIME(MIN.) =   0.56
  Tc(MIN.) =   14.02
  SUBAREA AREA(ACRES) =      7.29        SUBAREA RUNOFF(CFS) =    1.86
  EFFECTIVE AREA(ACRES) =      25.94     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        25.9          PEAK FLOW RATE(CFS) =        6.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.70   FLOW VELOCITY(FEET/SEC.) =   4.44
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30707.00 =   1789.00 FEET.

***********************************************************************
  FLOW PROCESS FROM NODE  30707.00 TO NODE  30708.00 IS CODE = 51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    432.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   461.00   CHANNEL SLOPE = 0.0499
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.819
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        5.94      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) =      7.20
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.18
  AVERAGE FLOW DEPTH(FEET) =   0.76   TRAVEL TIME(MIN.) =   1.84
  Tc(MIN.) =   15.86
```

```
  SUBAREA AREA(ACRES) =       5.94        SUBAREA RUNOFF(CFS) =    1.17
  EFFECTIVE AREA(ACRES) =      31.89     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        31.9          PEAK FLOW RATE(CFS) =        6.61
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.74   FLOW VELOCITY(FEET/SEC.) =   4.08
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30708.00 =   2250.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30708.00 TO NODE  30709.00 IS CODE = 51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    432.00  DOWNSTREAM(FEET) =    422.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE = 0.0588
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.804
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       13.07      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) =       7.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.53
  AVERAGE FLOW DEPTH(FEET) =   0.76   TRAVEL TIME(MIN.) =   0.62
  Tc(MIN.) =   16.48
  SUBAREA AREA(ACRES) =      13.07        SUBAREA RUNOFF(CFS) =    2.41
  EFFECTIVE AREA(ACRES) =      44.95     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        45.0          PEAK FLOW RATE(CFS) =        8.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.77   FLOW VELOCITY(FEET/SEC.) =   4.61
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30709.00 =   2420.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30709.00 TO NODE  30710.00 IS CODE = 51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    422.00  DOWNSTREAM(FEET) =    377.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1074.00   CHANNEL SLOPE = 0.0419
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   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              -       19.46      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) =        9.22
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TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.18
AVERAGE FLOW DEPTH(FEET) =   0.86    TRAVEL TIME(MIN.) =   4.28
Tc(MIN.) =   20.77
SUBAREA AREA(ACRES) =    19.46        SUBAREA RUNOFF(CFS) =    1.86
EFFECTIVE AREA(ACRES) =      64.41      AREA-AVERAGED Fm(INCH/HR) =   0.60
AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =        64.4          PEAK FLOW RATE(CFS) =       8.27
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE


END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.82    FLOW VELOCITY(FEET/SEC.) =   4.09
LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30710.00 =    3494.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  30710.00 TO NODE  30711.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    377.00  DOWNSTREAM(FEET) =    345.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   546.00    CHANNEL SLOPE =  0.0586
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.678
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp          Ap       SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED               -         9.60      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) =      8.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.78
  AVERAGE FLOW DEPTH(FEET) =   0.70    TRAVEL TIME(MIN.) =   1.57
  Tc(MIN.) =   22.34
  SUBAREA AREA(ACRES) =    9.60        SUBAREA RUNOFF(CFS) =    0.67
  EFFECTIVE AREA(ACRES) =      74.01      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        74.0          PEAK FLOW RATE(CFS) =       8.27
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.70    FLOW VELOCITY(FEET/SEC.) =   5.68
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30711.00 =    4040.00 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        74.0  TC(MIN.) =     22.34
  EFFECTIVE AREA(ACRES) =     74.01  AREA-AVERAGED Fm(INCH/HR)=  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =        8.27
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                        Michael Baker International
                       5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


  *************************** DESCRIPTION OF STUDY *************************
  * RMV PA-3 WATERSHED 8 EXISTING CONDITION                              *
  * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
  * 2-YR EV MARCH 2019 CCHIU                                           *
  *************************************************************************

   FILE NAME: X30802EV.DAT
   TIME/DATE OF STUDY: 06:55 03/26/2019
========================================================================
   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; 0.366
   10)   90.00; 0.300
   11)  120.00; 0.246
   12)  180.00; 0.190
   13)  360.00; 0.136
   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   60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   2   50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   3   40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   4   30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   5   20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  30800.00 TO NODE  30801.00 IS CODE =  21
  --------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
  ==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   324.00
  ELEVATION DATA: UPSTREAM(FEET) =    646.00  DOWNSTREAM(FEET) =    573.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.604
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.103
  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
  "CHAPARRAL,BROADLEAF"      -        0.69     0.60      1.000     0    9.60
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =       0.69   PEAK FLOW RATE(CFS) =       0.31


*******************************************************************************
  FLOW PROCESS FROM NODE  30801.00 TO NODE  30802.00 IS CODE =  51
  --------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    573.00  DOWNSTREAM(FEET) =    538.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   104.00   CHANNEL SLOPE = 0.3365
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.060
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        1.06     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) =       0.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.38
  AVERAGE FLOW DEPTH(FEET) =   0.20    TRAVEL TIME(MIN.) =   0.40
  Tc(MIN.) =   10.00
  SUBAREA AREA(ACRES) =     1.06       SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      1.75      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =       0.72

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
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```
   DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   4.81
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30802.00 =    428.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  30802.00 TO NODE  30803.00 IS CODE = 51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    538.00  DOWNSTREAM(FEET) =    500.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE = 0.2289
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.034
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -        1.89      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) =      1.09
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.67
   AVERAGE FLOW DEPTH(FEET) =  0.28   TRAVEL TIME(MIN.) =   0.59
   Tc(MIN.) =   10.59
   SUBAREA AREA(ACRES) =    1.89      SUBAREA RUNOFF(CFS) =    0.74
   EFFECTIVE AREA(ACRES) =    3.64     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) =      1.42

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   4.94
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30803.00 =    594.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  30803.00 TO NODE  30804.00 IS CODE = 51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    447.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   284.00   CHANNEL SLOPE = 0.1866
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.993
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -        3.78      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) =      2.09
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.07
   AVERAGE FLOW DEPTH(FEET) =  0.37   TRAVEL TIME(MIN.) =   0.93
   Tc(MIN.) =   11.53
   SUBAREA AREA(ACRES) =    3.78      SUBAREA RUNOFF(CFS) =    1.34
   EFFECTIVE AREA(ACRES) =    7.43     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       7.4        PEAK FLOW RATE(CFS) =      2.63

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.41   FLOW VELOCITY(FEET/SEC.) =   5.28
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30804.00 =    878.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  30804.00 TO NODE  30805.00 IS CODE = 51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =    438.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   101.00   CHANNEL SLOPE = 0.0891
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.976
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -        4.22      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) =      3.34
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.31
   AVERAGE FLOW DEPTH(FEET) =  0.51   TRAVEL TIME(MIN.) =   0.39
   Tc(MIN.) =   11.92
   SUBAREA AREA(ACRES) =    4.22      SUBAREA RUNOFF(CFS) =    1.43
   EFFECTIVE AREA(ACRES) =   11.65     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      11.7        PEAK FLOW RATE(CFS) =      3.94

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   4.52
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30805.00 =    979.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  30805.00 TO NODE  30806.00 IS CODE = 51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    438.00  DOWNSTREAM(FEET) =    419.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   418.00   CHANNEL SLOPE = 0.0455
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.892
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -        7.15      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) =      4.88
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.66
   AVERAGE FLOW DEPTH(FEET) =  0.67   TRAVEL TIME(MIN.) =   1.90
   Tc(MIN.) =   13.82
   SUBAREA AREA(ACRES) =    7.15      SUBAREA RUNOFF(CFS) =    1.88
   EFFECTIVE AREA(ACRES) =   18.80     AREA-AVERAGED Fm(INCH/HR) =   0.60
```

```
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        18.8        PEAK FLOW RATE(CFS) =        4.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.67   FLOW VELOCITY(FEET/SEC.) =   3.69
  LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30806.00 =   1397.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30806.00 TO NODE  30807.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    419.00  DOWNSTREAM(FEET) =     395.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   499.00   CHANNEL SLOPE = 0.0481
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.818
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         9.75      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) =      5.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.94
  AVERAGE FLOW DEPTH(FEET) =   0.71   TRAVEL TIME(MIN.) =   2.11
  Tc(MIN.) =   15.93
  SUBAREA AREA(ACRES) =      9.75        SUBAREA RUNOFF(CFS) =    1.91
  EFFECTIVE AREA(ACRES) =      28.56      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        28.6        PEAK FLOW RATE(CFS) =        5.60

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.69   FLOW VELOCITY(FEET/SEC.) =   3.90
  LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30807.00 =   1896.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30807.00 TO NODE  30808.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    395.00  DOWNSTREAM(FEET) =     358.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   698.00   CHANNEL SLOPE = 0.0530
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.750
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        10.78      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) =      6.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.16
  AVERAGE FLOW DEPTH(FEET) =   0.71   TRAVEL TIME(MIN.) =   2.80
  Tc(MIN.) =   18.73
```

```
  SUBAREA AREA(ACRES) =      10.78        SUBAREA RUNOFF(CFS) =    1.46
  EFFECTIVE AREA(ACRES) =      39.33      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        39.3        PEAK FLOW RATE(CFS) =        5.60
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.68   FLOW VELOCITY(FEET/SEC.) =   4.01
  LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30808.00 =   2594.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30808.00 TO NODE  30809.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =     332.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   102.00   CHANNEL SLOPE = 0.2549
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.746
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        10.00      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) =      6.26
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.21
  AVERAGE FLOW DEPTH(FEET) =   0.48   TRAVEL TIME(MIN.) =   0.18
  Tc(MIN.) =   18.91
  SUBAREA AREA(ACRES) =      10.00        SUBAREA RUNOFF(CFS) =    1.32
  EFFECTIVE AREA(ACRES) =      49.33      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        49.3        PEAK FLOW RATE(CFS) =        6.49

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOW VELOCITY(FEET/SEC.) =   9.26
  LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30809.00 =   2696.00 FEET.
=========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       49.3  TC(MIN.) =     18.91
  EFFECTIVE AREA(ACRES)  =      49.33  AREA-AVERAGED Fm(INCH/HR)= 0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       6.49
=========================================================================
=========================================================================
  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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                    Analysis prepared by:

                    Michael Baker International
                   5 Hutton Centre Drive Suite 500
                       Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 9A EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 2-YR EV MARCH 2019 CCHIU                                           *
 *********************************************************************

  FILE NAME: X39A02EV.DAT
  TIME/DATE OF STUDY: 15:35 03/25/2019
================================================================================
   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;  0.366
  10)    90.00;  0.300
  11)   120.00;  0.246
  12)   180.00;  0.190
  13)   360.00;  0.136
  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  60.0     30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30900.00 TO NODE  30901.00 IS CODE =  21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
  ELEVATION DATA: UPSTREAM(FEET) =    558.00  DOWNSTREAM(FEET) =    510.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.464
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.040
  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   10.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =       0.24
  TOTAL AREA(ACRES) =       0.60   PEAK FLOW RATE(CFS) =       0.24


*********************************************************************
  FLOW PROCESS FROM NODE  30901.00 TO NODE  30902.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    510.00  DOWNSTREAM(FEET) =    470.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   107.00   CHANNEL SLOPE = 0.3738
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.022
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       1.02      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) =       0.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.42
  AVERAGE FLOW DEPTH(FEET) =   0.18    TRAVEL TIME(MIN.) =   0.40
  Tc(MIN.) =   10.87
  SUBAREA AREA(ACRES) =    1.02      SUBAREA RUNOFF(CFS) =    0.39
  EFFECTIVE AREA(ACRES) =     1.62     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       1.6        PEAK FLOW RATE(CFS) =       0.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   4.70
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30902.00 =    432.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  30902.00 TO NODE  30903.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    445.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   126.00   CHANNEL SLOPE = 0.1984
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.000
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap    SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED            -        1.53     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) =      0.89
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.26
  AVERAGE FLOW DEPTH(FEET) =  0.26   TRAVEL TIME(MIN.) =  0.49
  Tc(MIN.) =  11.36
  SUBAREA AREA(ACRES) =    1.53      SUBAREA RUNOFF(CFS) =   0.55
  EFFECTIVE AREA(ACRES) =    3.15      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) =     1.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   4.41
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30903.00 =    558.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  30903.00 TO NODE  30904.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    445.00  DOWNSTREAM(FEET) =    404.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   252.00   CHANNEL SLOPE = 0.1627
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.959
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap    SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED            -        3.07     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) =      1.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.49
  AVERAGE FLOW DEPTH(FEET) =  0.35   TRAVEL TIME(MIN.) =  0.94
  Tc(MIN.) =  12.30
  SUBAREA AREA(ACRES) =    3.07      SUBAREA RUNOFF(CFS) =   0.99
  EFFECTIVE AREA(ACRES) =    6.22      AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       6.2        PEAK FLOW RATE(CFS) =     2.01
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.38   FLOW VELOCITY(FEET/SEC.) =   4.72
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30904.00 =    810.00 FEET.


*************************************************************************
  FLOW PROCESS FROM NODE  30904.00 TO NODE  30905.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    404.00  DOWNSTREAM(FEET) =    356.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   544.00   CHANNEL SLOPE = 0.0882
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.859
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap    SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED            -        4.76     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) =      2.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.00
  AVERAGE FLOW DEPTH(FEET) =  0.46   TRAVEL TIME(MIN.) =  2.26
  Tc(MIN.) =  14.56
  SUBAREA AREA(ACRES) =    4.76      SUBAREA RUNOFF(CFS) =   1.11
  EFFECTIVE AREA(ACRES) =   10.98      AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      11.0        PEAK FLOW RATE(CFS) =     2.56

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.46   FLOW VELOCITY(FEET/SEC.) =   3.99
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30905.00 =   1354.00 FEET.


*************************************************************************
  FLOW PROCESS FROM NODE  30905.00 TO NODE  30906.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    356.00  DOWNSTREAM(FEET) =    332.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   335.00   CHANNEL SLOPE = 0.0716
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.818
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap    SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED            -       12.78     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) =      3.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.06
  AVERAGE FLOW DEPTH(FEET) =  0.56   TRAVEL TIME(MIN.) =  1.37
  Tc(MIN.) =  15.94
  SUBAREA AREA(ACRES) =   12.78      SUBAREA RUNOFF(CFS) =   2.50
  EFFECTIVE AREA(ACRES) =   23.76      AREA-AVERAGED Fm(INCH/HR) =  0.60
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       23.8        PEAK FLOW RATE(CFS) =       4.65


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.60   FLOW VELOCITY(FEET/SEC.) =   4.31
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30906.00 =   1689.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  30906.00 TO NODE  30907.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     332.00  DOWNSTREAM(FEET) =     305.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  447.00   CHANNEL SLOPE = 0.0604
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.783
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        7.40      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) =     5.26
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.17
  AVERAGE FLOW DEPTH(FEET) =  0.58    TRAVEL TIME(MIN.) =   1.44
  Tc(MIN.) =   17.38
  SUBAREA AREA(ACRES) =     7.40        SUBAREA RUNOFF(CFS) =    1.22
  EFFECTIVE AREA(ACRES) =     31.16     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       31.2        PEAK FLOW RATE(CFS) =       5.13


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   5.14
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30907.00 =   2136.00 FEET.
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       31.2  TC(MIN.) =    17.38
  EFFECTIVE AREA(ACRES) =     31.16  AREA-AVERAGED Fm(INCH/HR)=  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       5.13
===============================================================================
===============================================================================
  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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                         Analysis prepared by:

                      Michael Baker International
                    5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 9B EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 2-YR EV MARCH 2019 CCHIU                                            *
 ********************************************************************

  FILE NAME: X39B02EV.DAT
  TIME/DATE OF STUDY: 15:45 03/25/2019
========================================================================
   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;  0.366
  10)   90.00;  0.300
  11)  120.00;  0.246
  12)  180.00;  0.190
  13)  360.00;  0.136
  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  60.0      30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0      25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0      20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0      15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0      10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30910.00 TO NODE  30911.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
  ELEVATION DATA: UPSTREAM(FEET) =   479.00  DOWNSTREAM(FEET) =    428.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.414
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.042
  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
  "GRASS"                    -        0.34     0.60      1.000     0   10.41
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =       0.13
  TOTAL AREA(ACRES) =        0.34   PEAK FLOW RATE(CFS) =       0.13


****************************************************************************
  FLOW PROCESS FROM NODE  30911.00 TO NODE  30912.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   428.00  DOWNSTREAM(FEET) =    380.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    91.00   CHANNEL SLOPE = 0.5275
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.027
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap     SCS
      LAND USE             GROUP     (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED                -        0.87     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) =       0.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.59
  AVERAGE FLOW DEPTH(FEET) =  0.15   TRAVEL TIME(MIN.) =   0.33
  Tc(MIN.) =   10.74
  SUBAREA AREA(ACRES) =     0.87      SUBAREA RUNOFF(CFS) =    0.33
  EFFECTIVE AREA(ACRES) =     1.20     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       1.2        PEAK FLOW RATE(CFS) =       0.46

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   5.18
   LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30912.00 =    420.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  30912.00 TO NODE  30913.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    380.00  DOWNSTREAM(FEET) =    372.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   91.00   CHANNEL SLOPE = 0.0879
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.003
   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     -
   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) =      0.61
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.79
   AVERAGE FLOW DEPTH(FEET) =  0.27   TRAVEL TIME(MIN.) =   0.54
   Tc(MIN.) =  11.29
   SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =   0.29
   EFFECTIVE AREA(ACRES) =    2.01     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       2.0          PEAK FLOW RATE(CFS) =       0.73

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   2.95
   LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30913.00 =    511.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  30913.00 TO NODE  30914.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =    355.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  111.00   CHANNEL SLOPE = 0.1532
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.982
   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     -
   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.) = 3.86
   AVERAGE FLOW DEPTH(FEET) =  0.29   TRAVEL TIME(MIN.) =   0.48
   Tc(MIN.) =  11.77
   SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =   0.45
   EFFECTIVE AREA(ACRES) =    3.31     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       3.3          PEAK FLOW RATE(CFS) =       1.14
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   4.00
   LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30914.00 =    622.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30914.00 TO NODE  30915.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    340.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  236.00   CHANNEL SLOPE = 0.0636
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.926
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -          1.86     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) =      1.41
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.06
   AVERAGE FLOW DEPTH(FEET) =  0.39   TRAVEL TIME(MIN.) =   1.28
   Tc(MIN.) =  13.05
   SUBAREA AREA(ACRES) =    1.86      SUBAREA RUNOFF(CFS) =   0.54
   EFFECTIVE AREA(ACRES) =    5.17     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       5.2          PEAK FLOW RATE(CFS) =       1.52

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =   3.13
   LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30915.00 =    858.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30915.00 TO NODE  30916.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    340.00  DOWNSTREAM(FEET) =    317.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  366.00   CHANNEL SLOPE = 0.0628
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.842
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -          2.39     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) =      1.78
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.20
   AVERAGE FLOW DEPTH(FEET) =  0.43   TRAVEL TIME(MIN.) =   1.90
   Tc(MIN.) =  14.96
   SUBAREA AREA(ACRES) =    2.39      SUBAREA RUNOFF(CFS) =   0.52
   EFFECTIVE AREA(ACRES) =    7.56     AREA-AVERAGED Fm(INCH/HR) =   0.60
```

```
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        7.6        PEAK FLOW RATE(CFS) =       1.65


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   3.16
  LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30916.00 =    1224.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  30916.00 TO NODE  30917.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     317.00  DOWNSTREAM(FEET) =     295.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   346.00   CHANNEL SLOPE = 0.0636
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.800
  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) =      2.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.36
  AVERAGE FLOW DEPTH(FEET) =   0.45    TRAVEL TIME(MIN.) =   1.72
  Tc(MIN.) =  16.67
  SUBAREA AREA(ACRES) =      4.70        SUBAREA RUNOFF(CFS) =     0.85
  EFFECTIVE AREA(ACRES) =     12.26      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       12.3        PEAK FLOW RATE(CFS) =       2.21


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.46   FLOW VELOCITY(FEET/SEC.) =   3.44
  LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30917.00 =    1570.00 FEET.
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        12.3  TC(MIN.) =     16.67
  EFFECTIVE AREA(ACRES) =      12.26  AREA-AVERAGED Fm(INCH/HR)=  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =        2.21
===============================================================================
===============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                         Michael Baker International
                        5 Hutton Centre Drive Suite 500
                             Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 10 EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 2-YR EV MARCH 2019 CCHIU                                             *
  ********************************************************************************

  FILE NAME: X31002EV.DAT
  TIME/DATE OF STUDY: 07:12 03/26/2019
================================================================================
   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;  0.366
  10)   90.00;  0.300
  11)  120.00;  0.246
  12)  180.00;  0.190
  13)  360.00;  0.136
  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  60.0    30.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

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```
  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  31000.00 TO NODE  31001.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
  ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM(FEET) =    455.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.457
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.119
  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
  "GRASS"                   -         0.99     0.60     1.000     0    9.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =        0.99   PEAK FLOW RATE(CFS) =        0.46


********************************************************************************
  FLOW PROCESS FROM NODE  31001.00 TO NODE  31002.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    430.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   222.00    CHANNEL SLOPE = 0.1126
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.033
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -         1.27     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.) =   3.21
  AVERAGE FLOW DEPTH(FEET) =  0.27    TRAVEL TIME(MIN.) =   1.15
  Tc(MIN.) =   10.61
  SUBAREA AREA(ACRES) =     1.27        SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      2.26      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.3         PEAK FLOW RATE(CFS) =        0.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

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```
   DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   3.39
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31002.00 =    542.00 FEET.


****************************************************************************
   FLOW PROCESS FROM NODE  31002.00 TO NODE  31003.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    430.00  DOWNSTREAM(FEET) =    422.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  159.00   CHANNEL SLOPE = 0.0503
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -         1.34      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) =       1.12
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.63
   AVERAGE FLOW DEPTH(FEET) =  0.38   TRAVEL TIME(MIN.) =  1.01
   Tc(MIN.) =  11.62
   SUBAREA AREA(ACRES) =    1.34      SUBAREA RUNOFF(CFS) =   0.47
   EFFECTIVE AREA(ACRES) =     3.61     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) =  0.39   FLOW VELOCITY(FEET/SEC.) =  2.71
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31003.00 =    701.00 FEET.


****************************************************************************
   FLOW PROCESS FROM NODE  31003.00 TO NODE  31004.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    422.00  DOWNSTREAM(FEET) =    379.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  506.00   CHANNEL SLOPE = 0.0850
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -         2.88      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) =       1.66
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.41
   AVERAGE FLOW DEPTH(FEET) =  0.35   TRAVEL TIME(MIN.) =  1.91
   Tc(MIN.) =  13.53
   SUBAREA AREA(ACRES) =    2.88      SUBAREA RUNOFF(CFS) =   0.79
   EFFECTIVE AREA(ACRES) =     6.48     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) =      1.78
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   4.49
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31004.00 =   1207.00 FEET.


****************************************************************************
   FLOW PROCESS FROM NODE  31004.00 TO NODE  31005.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =    365.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  357.00   CHANNEL SLOPE = 0.0392
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -         2.59      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) =       2.05
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.45
   AVERAGE FLOW DEPTH(FEET) =  0.45   TRAVEL TIME(MIN.) =  1.73
   Tc(MIN.) =  15.25
   SUBAREA AREA(ACRES) =    2.59      SUBAREA RUNOFF(CFS) =   0.55
   EFFECTIVE AREA(ACRES) =     9.07     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       9.1        PEAK FLOW RATE(CFS) =      1.91

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =  3.41
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31005.00 =   1564.00 FEET.


****************************************************************************
   FLOW PROCESS FROM NODE  31005.00 TO NODE  31006.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    365.00  DOWNSTREAM(FEET) =    334.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  696.00   CHANNEL SLOPE = 0.0445
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.760
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         5.86      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) =       2.34
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.76
   AVERAGE FLOW DEPTH(FEET) =  0.45   TRAVEL TIME(MIN.) =  3.08
   Tc(MIN.) =  18.34
   SUBAREA AREA(ACRES) =    5.86      SUBAREA RUNOFF(CFS) =   0.84
   EFFECTIVE AREA(ACRES) =    14.93     AREA-AVERAGED Fm(INCH/HR) =   0.60
```

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 AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        14.9        PEAK FLOW RATE(CFS) =       2.15


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.44   FLOW VELOCITY(FEET/SEC.) =   3.71
 LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31006.00 =   2260.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE  31006.00 TO NODE  31007.00 IS CODE =  51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    334.00  DOWNSTREAM(FEET) =    327.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE = 0.0400
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.743
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED              -       33.75     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) =     4.33
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.23
 AVERAGE FLOW DEPTH(FEET) =  0.58   TRAVEL TIME(MIN.) =   0.69
 Tc(MIN.) =  19.03
 SUBAREA AREA(ACRES) =    33.75        SUBAREA RUNOFF(CFS) =    4.36
 EFFECTIVE AREA(ACRES) =     48.68     AREA-AVERAGED Fm(INCH/HR) =   0.60
 AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        48.7        PEAK FLOW RATE(CFS) =       6.29


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.67   FLOW VELOCITY(FEET/SEC.) =   4.61
 LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31007.00 =   2435.00 FEET.
==============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        48.7  TC(MIN.) =     19.03
 EFFECTIVE AREA(ACRES) =     48.68  AREA-AVERAGED Fm(INCH/HR)=  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)   =        6.29
==============================================================================
==============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

                        Michael Baker International
                       5 Hutton Centre Drive Suite 500
                           Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 11 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 2-YR EV MARCH 2019 CCHIU                                           *
 **********************************************************************

  FILE NAME: X31102EV.DAT
  TIME/DATE OF STUDY: 07:16 03/26/2019
 ====================================================================
   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; 0.366
  10)   90.00; 0.300
  11)  120.00; 0.246
  12)  180.00; 0.190
  13)  360.00; 0.136
  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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31100.00 TO NODE  31101.00 IS CODE =  21
 --------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ====================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
   ELEVATION DATA: UPSTREAM(FEET) =    532.00  DOWNSTREAM(FEET) =    475.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.054
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.058
   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"              -        0.34     0.50     1.000    0   10.05
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.17
   TOTAL AREA(ACRES) =        0.34   PEAK FLOW RATE(CFS) =        0.17

 **********************************************************************
   FLOW PROCESS FROM NODE  31101.00 TO NODE  31102.00 IS CODE =  51
 --------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    475.00  DOWNSTREAM(FEET) =    455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   133.00    CHANNEL SLOPE = 0.1504
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.022
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap     SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
   USER-DEFINED              -        0.47     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) =       0.26
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.76
   AVERAGE FLOW DEPTH(FEET) =   0.18    TRAVEL TIME(MIN.) =   0.80
   Tc(MIN.) =   10.86
   SUBAREA AREA(ACRES) =     0.47       SUBAREA RUNOFF(CFS) =    0.18
   EFFECTIVE AREA(ACRES) =       0.82       AREA-AVERAGED Fm(INCH/HR) =   0.56
   AREA-AVERAGED Fp(INCH/HR) =   0.56  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =       0.34

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   2.98
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31102.00 =    455.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31102.00 TO NODE  31103.00 IS CODE =  51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    415.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   238.00   CHANNEL SLOPE =  0.1681
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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
   USER-DEFINED              -        0.58      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) =        0.44
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.29
   AVERAGE FLOW DEPTH(FEET) =   0.21   TRAVEL TIME(MIN.) =   1.20
   Tc(MIN.) =   12.06
   SUBAREA AREA(ACRES) =     0.58      SUBAREA RUNOFF(CFS) =    0.19
   EFFECTIVE AREA(ACRES) =      1.40    AREA-AVERAGED Fm(INCH/HR) =   0.58
   AREA-AVERAGED Fp(INCH/HR) =   0.58  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =          1.4       PEAK FLOW RATE(CFS) =      0.50

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   3.47
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31103.00 =    693.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31103.00 TO NODE  31104.00 IS CODE =  51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    415.00  DOWNSTREAM(FEET) =    379.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   394.00   CHANNEL SLOPE =  0.0914
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.890
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        1.61      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.) =   3.64
   AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   1.80
   Tc(MIN.) =   13.87
   SUBAREA AREA(ACRES) =     1.61      SUBAREA RUNOFF(CFS) =    0.42
   EFFECTIVE AREA(ACRES) =      3.01    AREA-AVERAGED Fm(INCH/HR) =   0.59
   AREA-AVERAGED Fp(INCH/HR) =   0.59  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =          3.0       PEAK FLOW RATE(CFS) =      0.82

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.27   FLOW VELOCITY(FEET/SEC.) =   3.74
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31104.00 =   1087.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31104.00 TO NODE  31105.00 IS CODE =  51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =    359.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0515
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.822
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        5.30      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) =        1.35
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.45
   AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   1.88
   Tc(MIN.) =   15.74
   SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =    1.06
   EFFECTIVE AREA(ACRES) =      8.31    AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =          8.3       PEAK FLOW RATE(CFS) =      1.69

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   3.67
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31105.00 =   1475.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31105.00 TO NODE  31106.00 IS CODE =  51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    359.00  DOWNSTREAM(FEET) =    345.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   316.00   CHANNEL SLOPE =  0.0443
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.787
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        2.41      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) =        1.90
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.54
   AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =   1.49
   Tc(MIN.) =   17.23
   SUBAREA AREA(ACRES) =     2.41      SUBAREA RUNOFF(CFS) =    0.41
   EFFECTIVE AREA(ACRES) =     10.72    AREA-AVERAGED Fm(INCH/HR) =   0.60
```

```
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        10.7        PEAK FLOW RATE(CFS) =        1.83

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   3.52
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31106.00 =   1791.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31106.00 TO NODE  31107.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    345.00  DOWNSTREAM(FEET) =    336.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    340.00   CHANNEL SLOPE = 0.0265
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.744
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
      LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       11.64     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) =       2.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.17
  AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   1.79
  Tc(MIN.) =   19.01
  SUBAREA AREA(ACRES) =    11.64       SUBAREA RUNOFF(CFS) =    1.51
  EFFECTIVE AREA(ACRES) =      22.36       AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        22.4        PEAK FLOW RATE(CFS) =        2.92

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   3.26
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31107.00 =   2131.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31107.00 TO NODE  31108.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    336.00  DOWNSTREAM(FEET) =    325.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    488.00   CHANNEL SLOPE = 0.0225
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.691
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
      LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        5.13     0.60     0.939     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.939
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.16
  AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   2.57
  Tc(MIN.) =   21.59
```

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  SUBAREA AREA(ACRES) =     5.13       SUBAREA RUNOFF(CFS) =    0.59
  EFFECTIVE AREA(ACRES) =      27.49       AREA-AVERAGED Fm(INCH/HR) =   0.59
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   0.99
  TOTAL AREA(ACRES) =        27.5        PEAK FLOW RATE(CFS) =        2.92
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.56   FLOW VELOCITY(FEET/SEC.) =   3.09
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31108.00 =   2619.00 FEET.

***********************************************************************************
  FLOW PROCESS FROM NODE  31108.00 TO NODE  31109.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =    275.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    731.00   CHANNEL SLOPE = 0.0684
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.635
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
      LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       10.26     0.60     0.934     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.934
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.86
  AVERAGE FLOW DEPTH(FEET) =   0.53   TRAVEL TIME(MIN.) =   3.15
  Tc(MIN.) =   24.74
  SUBAREA AREA(ACRES) =    10.26       SUBAREA RUNOFF(CFS) =    0.69
  EFFECTIVE AREA(ACRES) =      37.75       AREA-AVERAGED Fm(INCH/HR) =   0.58
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   0.97
  TOTAL AREA(ACRES) =        37.7        PEAK FLOW RATE(CFS) =        2.92
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   3.77
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31109.00 =   3350.00 FEET.

***********************************************************************************
  FLOW PROCESS FROM NODE  31109.00 TO NODE  31110.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    275.00  DOWNSTREAM(FEET) =    261.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    641.00   CHANNEL SLOPE = 0.0218
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.573
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
      LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       15.10     0.60     0.985     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.985
```

```
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.98
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.46
 AVERAGE FLOW DEPTH(FEET) =   0.64   TRAVEL TIME(MIN.) =   4.35
 Tc(MIN.) =   29.09
 SUBAREA AREA(ACRES) =    15.10        SUBAREA RUNOFF(CFS) =    0.12
 EFFECTIVE AREA(ACRES) =      52.85     AREA-AVERAGED Fm(INCH/HR) =   0.59
 AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   0.98
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) =        52.8         PEAK FLOW RATE(CFS) =       2.92
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.63   FLOW VELOCITY(FEET/SEC.) =   2.45
 LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31110.00 =    3991.00 FEET.
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        52.8  TC(MIN.) =     29.09
 EFFECTIVE AREA(ACRES) =     52.85  AREA-AVERAGED Fm(INCH/HR)=  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 0.977
 PEAK FLOW RATE(CFS)    =        2.92
================================================================================
================================================================================
 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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                          Analysis prepared by:

                     Michael Baker International
                    5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


  ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 12 EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 2-YR EV MARCH 2019 CCHIU                                               *
  ***********************************************************************

   FILE NAME: X31202EV.DAT
   TIME/DATE OF STUDY: 07:35 03/26/2019
 ======================================================================
   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; 0.366
   10)   90.00; 0.300
   11)  120.00; 0.246
   12)  180.00; 0.190
   13)  360.00; 0.136
   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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31200.00 TO NODE  31201.00 IS CODE =  21
 -----------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =======================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
   ELEVATION DATA: UPSTREAM(FEET) =    761.00  DOWNSTREAM(FEET) =    639.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.619
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.209
   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"               -        0.91     0.60     1.000     0   8.62
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.50
   TOTAL AREA(ACRES) =       0.91   PEAK FLOW RATE(CFS) =        0.50


 *************************************************************************
   FLOW PROCESS FROM NODE  31201.00 TO NODE  31202.00 IS CODE =  51
 -----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    639.00  DOWNSTREAM(FEET) =    595.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE = 0.2009
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   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                -        0.97     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) =       0.72
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.94
   AVERAGE FLOW DEPTH(FEET) =   0.25    TRAVEL TIME(MIN.) =   0.93
   Tc(MIN.) =    9.54
   SUBAREA AREA(ACRES) =    0.97      SUBAREA RUNOFF(CFS) =    0.44
   EFFECTIVE AREA(ACRES) =      1.88     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       1.9        PEAK FLOW RATE(CFS) =       0.86

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   4.17
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31202.00 =     540.00 FEET.


*******************************************************************************
   FLOW PROCESS FROM NODE  31202.00 TO NODE  31203.00 IS CODE =  51
   -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    595.00  DOWNSTREAM(FEET) =     589.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE = 0.1200
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.086
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        2.51     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) =       1.41
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.88
   AVERAGE FLOW DEPTH(FEET) =  0.35   TRAVEL TIME(MIN.) =   0.22
   Tc(MIN.) =   9.76
   SUBAREA AREA(ACRES) =     2.51      SUBAREA RUNOFF(CFS) =    1.10
   EFFECTIVE AREA(ACRES) =     4.38     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =       1.92

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   4.16
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31203.00 =     590.00 FEET.


*******************************************************************************
   FLOW PROCESS FROM NODE  31203.00 TO NODE  31204.00 IS CODE =  51
   -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    589.00  DOWNSTREAM(FEET) =     560.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   308.00   CHANNEL SLOPE = 0.0942
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -        4.19     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) =       2.70
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.21
   AVERAGE FLOW DEPTH(FEET) =  0.46   TRAVEL TIME(MIN.) =   1.22
   Tc(MIN.) =  10.98
   SUBAREA AREA(ACRES) =     4.19      SUBAREA RUNOFF(CFS) =    1.57
   EFFECTIVE AREA(ACRES) =     8.57     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) =       3.22
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   4.31
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31204.00 =     898.00 FEET.


*******************************************************************************
   FLOW PROCESS FROM NODE  31204.00 TO NODE  31205.00 IS CODE =  51
   -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    560.00  DOWNSTREAM(FEET) =     537.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   457.00   CHANNEL SLOPE = 0.0503
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.927
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        8.19     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) =       4.43
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.72
   AVERAGE FLOW DEPTH(FEET) =  0.63   TRAVEL TIME(MIN.) =   2.05
   Tc(MIN.) =  13.03
   SUBAREA AREA(ACRES) =     8.19      SUBAREA RUNOFF(CFS) =    2.41
   EFFECTIVE AREA(ACRES) =    16.76     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       16.8        PEAK FLOW RATE(CFS) =       4.93

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.65   FLOW VELOCITY(FEET/SEC.) =   3.85
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31205.00 =    1355.00 FEET.


*******************************************************************************
   FLOW PROCESS FROM NODE  31205.00 TO NODE  31206.00 IS CODE =  51
   -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    537.00  DOWNSTREAM(FEET) =     479.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   780.00   CHANNEL SLOPE = 0.0744
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.821
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       15.47     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) =       6.49
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.73
   AVERAGE FLOW DEPTH(FEET) =  0.68   TRAVEL TIME(MIN.) =   2.75
   Tc(MIN.) =  15.78
   SUBAREA AREA(ACRES) =    15.47      SUBAREA RUNOFF(CFS) =    3.08
   EFFECTIVE AREA(ACRES) =    32.24     AREA-AVERAGED Fm(INCH/HR) =   0.60
```

```
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       32.2       PEAK FLOW RATE(CFS) =       6.43

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.67   FLOW VELOCITY(FEET/SEC.) =  4.71
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31206.00 =   2135.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31206.00 TO NODE  31207.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    479.00  DOWNSTREAM(FEET) =     455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    551.00   CHANNEL SLOPE = 0.0436
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.769
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -       37.81      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) =      9.34
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.23
   AVERAGE FLOW DEPTH(FEET) =   0.86   TRAVEL TIME(MIN.) =   2.17
   Tc(MIN.) =   17.94
   SUBAREA AREA(ACRES) =     37.81       SUBAREA RUNOFF(CFS) =     5.77
   EFFECTIVE AREA(ACRES) =      70.05      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       70.1       PEAK FLOW RATE(CFS) =      10.68

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.90   FLOW VELOCITY(FEET/SEC.) =  4.42
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31207.00 =   2686.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31207.00 TO NODE  31208.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =     434.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    743.00   CHANNEL SLOPE = 0.0283
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.698
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -       18.18      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) =     11.50
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.80
   AVERAGE FLOW DEPTH(FEET) =   1.00   TRAVEL TIME(MIN.) =   3.26
   Tc(MIN.) =   21.20
```

```
   SUBAREA AREA(ACRES) =      18.18       SUBAREA RUNOFF(CFS) =     1.61
   EFFECTIVE AREA(ACRES) =      88.23      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       88.2       PEAK FLOW RATE(CFS) =      10.68
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.97   FLOW VELOCITY(FEET/SEC.) =  3.76
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31208.00 =   3429.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31208.00 TO NODE  31209.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    434.00  DOWNSTREAM(FEET) =     410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    899.00   CHANNEL SLOPE = 0.0267
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.627
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -       42.09      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) =      11.23
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.71
   AVERAGE FLOW DEPTH(FEET) =   1.00   TRAVEL TIME(MIN.) =   4.04
   Tc(MIN.) =   25.24
   SUBAREA AREA(ACRES) =      42.09       SUBAREA RUNOFF(CFS) =     1.01
   EFFECTIVE AREA(ACRES) =     130.32      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      130.3       PEAK FLOW RATE(CFS) =      10.68
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.99   FLOW VELOCITY(FEET/SEC.) =  3.66
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31209.00 =   4328.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31209.00 TO NODE  31210.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =     390.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    724.00   CHANNEL SLOPE = 0.0276
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.581
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -       27.15      0.60     0.999     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.999
```

```
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.70
  AVERAGE FLOW DEPTH(FEET) =   0.98    TRAVEL TIME(MIN.) =   3.26
  Tc(MIN.) =   28.50
  SUBAREA AREA(ACRES) =     27.15       SUBAREA RUNOFF(CFS) =    0.01
  EFFECTIVE AREA(ACRES) =    157.48     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =      157.5       PEAK FLOW RATE(CFS) =     10.68
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.98   FLOW VELOCITY(FEET/SEC.) =   3.71
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31210.00 =   5052.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31210.00 TO NODE  31211.00 IS CODE =  51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     390.00  DOWNSTREAM(FEET) =     364.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1073.00   CHANNEL SLOPE = 0.0242
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.532
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -         15.95     0.60      0.963     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.963
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.54
  AVERAGE FLOW DEPTH(FEET) =   1.01    TRAVEL TIME(MIN.) =   5.06
  Tc(MIN.) =   33.56
  SUBAREA AREA(ACRES) =     15.95       SUBAREA RUNOFF(CFS) =    0.28
  EFFECTIVE AREA(ACRES) =    173.43     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =      173.4       PEAK FLOW RATE(CFS) =     10.68
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.00   FLOW VELOCITY(FEET/SEC.) =   3.53
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31211.00 =   6125.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31211.00 TO NODE  31212.00 IS CODE =  51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     364.00  DOWNSTREAM(FEET) =     318.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1175.00   CHANNEL SLOPE = 0.0391
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.496
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -         81.12     0.60      0.928     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.928
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.35
  AVERAGE FLOW DEPTH(FEET) =   0.96    TRAVEL TIME(MIN.) =   4.50
  Tc(MIN.) =   38.06
  SUBAREA AREA(ACRES) =     81.12       SUBAREA RUNOFF(CFS) =    2.60
  EFFECTIVE AREA(ACRES) =    254.55     AREA-AVERAGED Fm(INCH/HR) =   0.58
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   0.97
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =      254.5       PEAK FLOW RATE(CFS) =     10.68
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.92   FLOW VELOCITY(FEET/SEC.) =   4.22
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31212.00 =   7300.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31212.00 TO NODE  31213.00 IS CODE =  51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     318.00  DOWNSTREAM(FEET) =     317.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  506.00   CHANNEL SLOPE = 0.0020
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.455
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -          1.00     0.60      0.850     -
  USER-DEFINED              -         28.30     0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.995
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.38
  AVERAGE FLOW DEPTH(FEET) =   1.61    TRAVEL TIME(MIN.) =   6.10
  Tc(MIN.) =   44.16
  SUBAREA AREA(ACRES) =     29.30       SUBAREA RUNOFF(CFS) =    0.06
  EFFECTIVE AREA(ACRES) =    283.85     AREA-AVERAGED Fm(INCH/HR) =   0.59
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   0.98
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
```

```
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) =        283.8          PEAK FLOW RATE(CFS) =      10.68
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.61   FLOW VELOCITY(FEET/SEC.) =   1.38
 LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31213.00 =    7806.00 FEET.
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        283.8  TC(MIN.) =     44.16
 EFFECTIVE AREA(ACRES) =     283.85  AREA-AVERAGED Fm(INCH/HR)=  0.59
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 0.977
 PEAK FLOW RATE(CFS)    =       10.68
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

                       Michael Baker International
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                          Santa Ana, CA92707


   ************************** DESCRIPTION OF STUDY **************************
  * RMV PA-3 WATERSHED 13 EXISTING CONDITION                               *
  * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
  * 2-YR EV MARCH 2019 CCHIU                                               *
   **********************************************************************

   FILE NAME: X31302EV.DAT
   TIME/DATE OF STUDY: 07:37 03/26/2019
 ================================================================================
   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;  0.366
   10)   90.00;  0.300
   11)  120.00;  0.246
   12)  180.00;  0.190
   13)  360.00;  0.136
   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   60.0     30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2   50.0     25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3   40.0     20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4   30.0     15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5   20.0     10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31300.00 TO NODE  31301.00 IS CODE =  21
 --------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
   ELEVATION DATA: UPSTREAM(FEET) =    535.00  DOWNSTREAM(FEET) =     490.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.423
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.041
   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
   "GRASS"                    -        0.53      0.60      1.000    0   10.42
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =      0.21
   TOTAL AREA(ACRES) =       0.53   PEAK FLOW RATE(CFS) =      0.21


 ****************************************************************************
   FLOW PROCESS FROM NODE  31301.00 TO NODE  31302.00 IS CODE =  51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =     480.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00    CHANNEL SLOPE = 0.0746
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.000
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp         Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED                -        1.00      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) =       0.39
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.38
   AVERAGE FLOW DEPTH(FEET) =   0.23    TRAVEL TIME(MIN.) =   0.94
   Tc(MIN.) =   11.36
   SUBAREA AREA(ACRES) =    1.00       SUBAREA RUNOFF(CFS) =    0.36
   EFFECTIVE AREA(ACRES) =     1.53      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =      0.55

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
      DEPTH(FEET) =  0.27   FLOW VELOCITY(FEET/SEC.) =   2.52
      LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31302.00 =    450.00 FEET.


**********************************************************************
  FLOW PROCESS FROM NODE  31302.00 TO NODE  31303.00 IS CODE =  51
  ------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ==================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    480.00  DOWNSTREAM(FEET) =    469.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  237.00   CHANNEL SLOPE =  0.0464
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.927
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
        LAND USE           GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        1.63     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) =       0.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.38
  AVERAGE FLOW DEPTH(FEET) =  0.33   TRAVEL TIME(MIN.) =   1.66
  Tc(MIN.) =   13.02
  SUBAREA AREA(ACRES) =    1.63      SUBAREA RUNOFF(CFS) =    0.48
  EFFECTIVE AREA(ACRES) =    3.16     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) =      0.93

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   2.45
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31303.00 =    687.00 FEET.


**********************************************************************
  FLOW PROCESS FROM NODE  31303.00 TO NODE  31304.00 IS CODE =  51
  ------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ==================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    469.00  DOWNSTREAM(FEET) =    418.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  483.00   CHANNEL SLOPE =  0.1056
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   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              -        3.16     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) =       1.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.64
  AVERAGE FLOW DEPTH(FEET) =  0.34   TRAVEL TIME(MIN.) =   2.21
  Tc(MIN.) =   15.23
  SUBAREA AREA(ACRES) =    3.16      SUBAREA RUNOFF(CFS) =    0.67
  EFFECTIVE AREA(ACRES) =    6.32     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       6.3         PEAK FLOW RATE(CFS) =      1.33
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   3.67
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31304.00 =   1170.00 FEET.


**************************************************************************
  FLOW PROCESS FROM NODE  31304.00 TO NODE  31305.00 IS CODE =  51
  ----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    418.00  DOWNSTREAM(FEET) =    381.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  469.00   CHANNEL SLOPE =  0.0789
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.784
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
        LAND USE           GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       10.56     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) =       2.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.69
  AVERAGE FLOW DEPTH(FEET) =  0.45   TRAVEL TIME(MIN.) =   2.12
  Tc(MIN.) =   17.35
  SUBAREA AREA(ACRES) =   10.56      SUBAREA RUNOFF(CFS) =    1.75
  EFFECTIVE AREA(ACRES) =   16.88     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      16.9         PEAK FLOW RATE(CFS) =      2.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.49   FLOW VELOCITY(FEET/SEC.) =   3.95
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31305.00 =   1639.00 FEET.


**************************************************************************
  FLOW PROCESS FROM NODE  31305.00 TO NODE  31306.00 IS CODE =  51
  ----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    381.00  DOWNSTREAM(FEET) =    363.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  398.00   CHANNEL SLOPE =  0.0452
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.747
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
        LAND USE           GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       19.15     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) =       4.06
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.32
  AVERAGE FLOW DEPTH(FEET) =  0.56   TRAVEL TIME(MIN.) =   1.53
  Tc(MIN.) =   18.88
  SUBAREA AREA(ACRES) =   19.15      SUBAREA RUNOFF(CFS) =    2.53
  EFFECTIVE AREA(ACRES) =   36.03     AREA-AVERAGED Fm(INCH/HR) =   0.60
```

```
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       36.0         PEAK FLOW RATE(CFS) =        4.76

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.59   FLOW VELOCITY(FEET/SEC.) =   4.53
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31306.00 =   2037.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31306.00 TO NODE  31307.00 IS CODE = 51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     363.00  DOWNSTREAM(FEET) =     313.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    836.00    CHANNEL SLOPE = 0.0598
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.692
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        13.40     0.60      0.998     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.998
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.20
  AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   2.68
  Tc(MIN.) =   21.57
  SUBAREA AREA(ACRES) =      13.40        SUBAREA RUNOFF(CFS) =    1.12
  EFFECTIVE AREA(ACRES) =      49.43       AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       49.4         PEAK FLOW RATE(CFS) =        4.76
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.56   FLOW VELOCITY(FEET/SEC.) =   5.03
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31307.00 =   2873.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31307.00 TO NODE  31308.00 IS CODE = 51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     313.00  DOWNSTREAM(FEET) =     302.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    763.00    CHANNEL SLOPE = 0.0144
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.618
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        11.99     0.60      0.998     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.998
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.88
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.95
  AVERAGE FLOW DEPTH(FEET) =   0.74   TRAVEL TIME(MIN.) =   4.32
```

```
  Tc(MIN.) =   25.88
  SUBAREA AREA(ACRES) =      11.99        SUBAREA RUNOFF(CFS) =    0.20
  EFFECTIVE AREA(ACRES) =      61.43       AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       61.4         PEAK FLOW RATE(CFS) =        4.76
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.74   FLOW VELOCITY(FEET/SEC.) =   2.94
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31308.00 =   3636.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31308.00 TO NODE  31309.00 IS CODE = 51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     302.00  DOWNSTREAM(FEET) =     289.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1009.00    CHANNEL SLOPE = 0.0129
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.545
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        21.83     0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.82
  AVERAGE FLOW DEPTH(FEET) =   0.75   TRAVEL TIME(MIN.) =   5.96
  Tc(MIN.) =   31.85
  SUBAREA AREA(ACRES) =      21.83        SUBAREA RUNOFF(CFS) =    0.00
  EFFECTIVE AREA(ACRES) =      83.25       AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =       83.3         PEAK FLOW RATE(CFS) =        4.76
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.75   FLOW VELOCITY(FEET/SEC.) =   2.82
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31309.00 =   4645.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31309.00 TO NODE  31310.00 IS CODE = 51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     289.00  DOWNSTREAM(FEET) =     275.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    628.00    CHANNEL SLOPE = 0.0223
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.521
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
    LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -       37.10     0.60     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.76
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.47
 AVERAGE FLOW DEPTH(FEET) =   0.68    TRAVEL TIME(MIN.) =   3.01
 Tc(MIN.) =   34.86
 SUBAREA AREA(ACRES) =    37.10       SUBAREA RUNOFF(CFS) =    0.00
 EFFECTIVE AREA(ACRES) =   120.35     AREA-AVERAGED Fm(INCH/HR) =   0.60
 AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) =      120.4         PEAK FLOW RATE(CFS) =      4.76
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.68    FLOW VELOCITY(FEET/SEC.) =   3.47
 LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31310.00 =    5273.00 FEET.
==============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      120.4  TC(MIN.) =     34.86
 EFFECTIVE AREA(ACRES) =     120.35  AREA-AVERAGED Fm(INCH/HR)=  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)   =       4.76
==============================================================================
==============================================================================
 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 **************************
 * RMV PA-3 WATERSHED 14 EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 2-YR EV MARCH 2019 CCHIU                                             *
 ***********************************************************************

  FILE NAME: X31402EV.DAT
  TIME/DATE OF STUDY: 07:53 03/26/2019
========================================================================
  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; 0.366
  10)   90.00; 0.300
  11)  120.00; 0.246
  12)  180.00; 0.190
  13)  360.00; 0.136
  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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31400.00 TO NODE  31401.00 IS CODE =  21
 ------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
  ELEVATION DATA: UPSTREAM(FEET) =    868.00  DOWNSTREAM(FEET) =    772.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.143
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.153
  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
  "CHAPARRAL,NARROWLEAF"    -       0.99     0.60     1.000     0   9.14
  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) =       0.99   PEAK FLOW RATE(CFS) =       0.49


 *************************************************************************
  FLOW PROCESS FROM NODE  31401.00 TO NODE  31402.00 IS CODE =  51
 ------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    772.00  DOWNSTREAM(FEET) =    750.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00    CHANNEL SLOPE = 0.1642
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.087
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
     LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       1.23     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) =       0.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.69
  AVERAGE FLOW DEPTH(FEET) =  0.26   TRAVEL TIME(MIN.) =   0.60
  Tc(MIN.) =    9.75
  SUBAREA AREA(ACRES) =    1.23       SUBAREA RUNOFF(CFS) =   0.54
  EFFECTIVE AREA(ACRES) =     2.21      AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      2.2        PEAK FLOW RATE(CFS) =      0.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
       DEPTH(FEET) =  0.29    FLOW VELOCITY(FEET/SEC.) =   3.98
       LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31402.00 =    461.00 FEET.


************************************************************************
   FLOW PROCESS FROM NODE  31402.00 TO NODE  31403.00 IS CODE = 51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    750.00  DOWNSTREAM(FEET) =     710.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE = 0.1258
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.009
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         1.42      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) =        1.23
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.76
   AVERAGE FLOW DEPTH(FEET) =   0.33    TRAVEL TIME(MIN.) =   1.41
   Tc(MIN.) =   11.16
   SUBAREA AREA(ACRES) =     1.42       SUBAREA RUNOFF(CFS) =    0.52
   EFFECTIVE AREA(ACRES) =      3.64      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) =       1.34

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.34    FLOW VELOCITY(FEET/SEC.) =   3.90
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31403.00 =    779.00 FEET.


************************************************************************
   FLOW PROCESS FROM NODE  31403.00 TO NODE  31404.00 IS CODE = 51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    710.00  DOWNSTREAM(FEET) =     688.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   181.00   CHANNEL SLOPE = 0.1215
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.976
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         1.91      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) =        1.66
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.07
   AVERAGE FLOW DEPTH(FEET) =   0.37    TRAVEL TIME(MIN.) =   0.74
   Tc(MIN.) =   11.90
   SUBAREA AREA(ACRES) =     1.91       SUBAREA RUNOFF(CFS) =    0.65
   EFFECTIVE AREA(ACRES) =      5.55      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       5.5        PEAK FLOW RATE(CFS) =       1.88
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   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.39    FLOW VELOCITY(FEET/SEC.) =   4.20
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31404.00 =    960.00 FEET.

************************************************************************
   FLOW PROCESS FROM NODE  31404.00 TO NODE  31405.00 IS CODE = 51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    688.00  DOWNSTREAM(FEET) =    675.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   237.00   CHANNEL SLOPE = 0.0549
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.923
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         2.67      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) =        2.27
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.23
   AVERAGE FLOW DEPTH(FEET) =   0.48    TRAVEL TIME(MIN.) =   1.22
   Tc(MIN.) =   13.12
   SUBAREA AREA(ACRES) =     2.67       SUBAREA RUNOFF(CFS) =    0.78
   EFFECTIVE AREA(ACRES) =      8.21      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       8.2        PEAK FLOW RATE(CFS) =       2.39

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.49    FLOW VELOCITY(FEET/SEC.) =   3.30
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31405.00 =   1197.00 FEET.

************************************************************************
   FLOW PROCESS FROM NODE  31405.00 TO NODE  31406.00 IS CODE = 51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =    668.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    78.00   CHANNEL SLOPE = 0.0897
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.909
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         7.51      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) =        3.43
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.33
   AVERAGE FLOW DEPTH(FEET) =   0.51    TRAVEL TIME(MIN.) =   0.30
   Tc(MIN.) =   13.42
   SUBAREA AREA(ACRES) =     7.51       SUBAREA RUNOFF(CFS) =    2.09
   EFFECTIVE AREA(ACRES) =     15.73      AREA-AVERAGED Fm(INCH/HR) =   0.60
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  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       15.7      PEAK FLOW RATE(CFS) =       4.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.56   FLOW VELOCITY(FEET/SEC.) =   4.63
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31406.00 =   1275.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31406.00 TO NODE  31407.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     668.00  DOWNSTREAM(FEET) =     640.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    558.00   CHANNEL SLOPE = 0.0502
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.821
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         9.79     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) =      5.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.91
  AVERAGE FLOW DEPTH(FEET) =   0.68   TRAVEL TIME(MIN.) =   2.38
  Tc(MIN.) =   15.80
  SUBAREA AREA(ACRES) =      9.79      SUBAREA RUNOFF(CFS) =    1.95
  EFFECTIVE AREA(ACRES) =     25.52      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       25.5      PEAK FLOW RATE(CFS) =       5.07

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.66   FLOW VELOCITY(FEET/SEC.) =   3.87
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31407.00 =   1833.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31407.00 TO NODE  31408.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     640.00  DOWNSTREAM(FEET) =     607.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    710.00   CHANNEL SLOPE = 0.0465
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.749
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        18.46     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) =      6.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.96
  AVERAGE FLOW DEPTH(FEET) =   0.73   TRAVEL TIME(MIN.) =   2.99
  Tc(MIN.) =   18.79
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  SUBAREA AREA(ACRES) =       18.46      SUBAREA RUNOFF(CFS) =    2.48
  EFFECTIVE AREA(ACRES) =     43.97      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       44.0      PEAK FLOW RATE(CFS) =       5.91

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.71   FLOW VELOCITY(FEET/SEC.) =   3.88
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31408.00 =   2543.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31408.00 TO NODE  31409.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     607.00  DOWNSTREAM(FEET) =     574.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    674.00   CHANNEL SLOPE = 0.0490
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.692
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         9.15     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) =      6.29
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.02
  AVERAGE FLOW DEPTH(FEET) =   0.72   TRAVEL TIME(MIN.) =   2.79
  Tc(MIN.) =   21.58
  SUBAREA AREA(ACRES) =      9.15      SUBAREA RUNOFF(CFS) =    0.76
  EFFECTIVE AREA(ACRES) =     53.13      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       53.1      PEAK FLOW RATE(CFS) =       5.91
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.70   FLOW VELOCITY(FEET/SEC.) =   3.96
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31409.00 =   3217.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31409.00 TO NODE  31410.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     574.00  DOWNSTREAM(FEET) =     540.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    817.00   CHANNEL SLOPE = 0.0416
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.629
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        54.88     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) =      6.71
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    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.87
    AVERAGE FLOW DEPTH(FEET) =   0.76    TRAVEL TIME(MIN.) =    3.52
    Tc(MIN.) =   25.10
    SUBAREA AREA(ACRES) =    54.88        SUBAREA RUNOFF(CFS) =    1.42
    EFFECTIVE AREA(ACRES) =    108.01      AREA-AVERAGED Fm(INCH/HR) =   0.60
    AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =     108.0         PEAK FLOW RATE(CFS) =       5.91
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.73   FLOW VELOCITY(FEET/SEC.) = 3.72
    LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31410.00 =   4034.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31410.00 TO NODE  31411.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1364.00   CHANNEL SLOPE = 0.0293
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.544
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -      40.22     0.60     1.000      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.28
   AVERAGE FLOW DEPTH(FEET) =   0.78    TRAVEL TIME(MIN.) =    6.94
   Tc(MIN.) =   32.04
   SUBAREA AREA(ACRES) =    40.22        SUBAREA RUNOFF(CFS) =    0.00
   EFFECTIVE AREA(ACRES) =    148.22      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TOTAL AREA(ACRES) =     148.2         PEAK FLOW RATE(CFS) =       5.91
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.78   FLOW VELOCITY(FEET/SEC.) = 3.28
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31411.00 =   5398.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31411.00 TO NODE  31412.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    468.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  985.00   CHANNEL SLOPE = 0.0325
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
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  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.505
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -     100.09     0.60     1.000      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.41
   AVERAGE FLOW DEPTH(FEET) =   0.76    TRAVEL TIME(MIN.) =    4.82
   Tc(MIN.) =   36.86
   SUBAREA AREA(ACRES) =   100.09        SUBAREA RUNOFF(CFS) =    0.00
   EFFECTIVE AREA(ACRES) =    248.31      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TOTAL AREA(ACRES) =     248.3         PEAK FLOW RATE(CFS) =       5.91
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.76   FLOW VELOCITY(FEET/SEC.) = 3.41
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31412.00 =   6383.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31412.00 TO NODE  31413.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    468.00  DOWNSTREAM(FEET) =    428.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1135.00   CHANNEL SLOPE = 0.0352
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.466
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -      56.18     0.60     1.000      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.50
   AVERAGE FLOW DEPTH(FEET) =   0.75    TRAVEL TIME(MIN.) =    5.41
   Tc(MIN.) =   42.27
   SUBAREA AREA(ACRES) =    56.18        SUBAREA RUNOFF(CFS) =    0.00
   EFFECTIVE AREA(ACRES) =    304.49      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TOTAL AREA(ACRES) =     304.5         PEAK FLOW RATE(CFS) =       5.91
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.75   FLOW VELOCITY(FEET/SEC.) = 3.50
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     LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31413.00 =    7518.00 FEET.


*********************************************************************
  FLOW PROCESS FROM NODE  31413.00 TO NODE  31414.00 IS CODE = 51
-------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    428.00  DOWNSTREAM(FEET) =    394.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   888.00   CHANNEL SLOPE = 0.0383
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.442
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp        Ap     SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         35.49      0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.62
  AVERAGE FLOW DEPTH(FEET) =   0.74    TRAVEL TIME(MIN.) =   4.09
  Tc(MIN.) =   46.35
  SUBAREA AREA(ACRES) =     35.49       SUBAREA RUNOFF(CFS) =    0.00
  EFFECTIVE AREA(ACRES) =    339.98     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =       340.0         PEAK FLOW RATE(CFS) =     5.91
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.74   FLOW VELOCITY(FEET/SEC.) =   3.62
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31414.00 =    8406.00 FEET.

*********************************************************************
  FLOW PROCESS FROM NODE  31414.00 TO NODE  31415.00 IS CODE = 51
-------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    394.00  DOWNSTREAM(FEET) =    368.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1044.00   CHANNEL SLOPE = 0.0249
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.409
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp        Ap     SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         26.50      0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.09
```
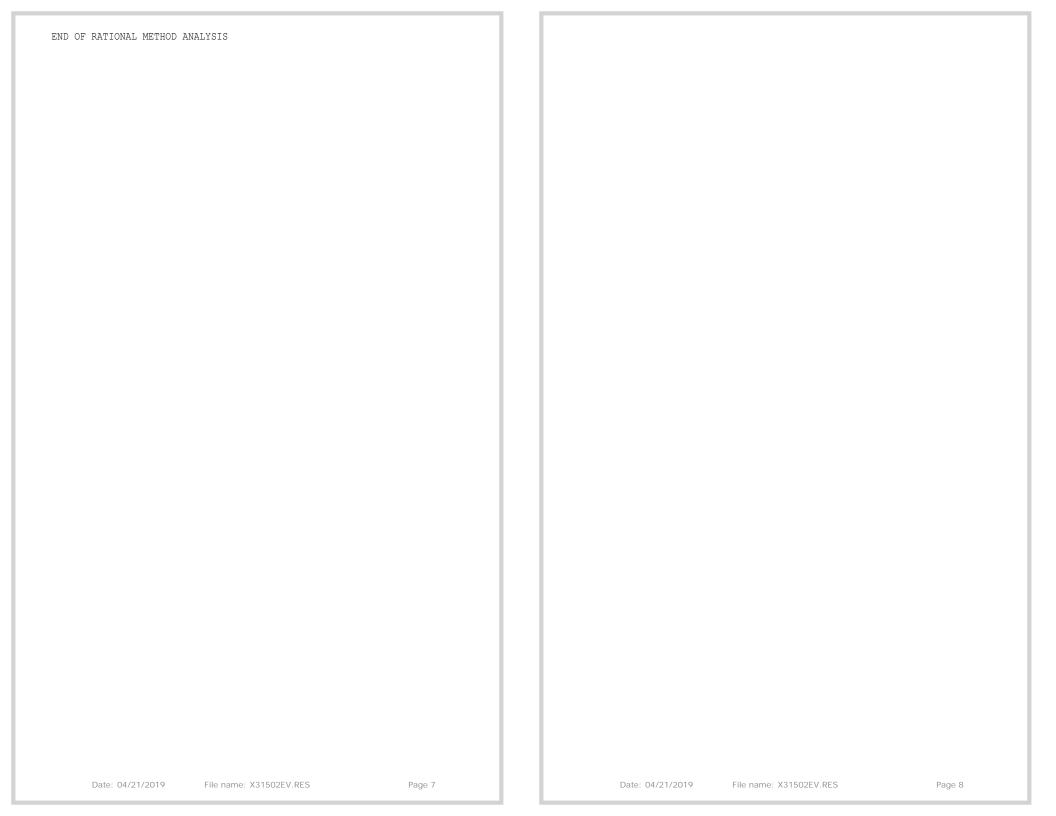
```
  AVERAGE FLOW DEPTH(FEET) =   0.80    TRAVEL TIME(MIN.) =   5.63
  Tc(MIN.) =   51.99
  SUBAREA AREA(ACRES) =     26.50       SUBAREA RUNOFF(CFS) =    0.00
  EFFECTIVE AREA(ACRES) =    366.48     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =       366.5         PEAK FLOW RATE(CFS) =     5.91
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.80   FLOW VELOCITY(FEET/SEC.) =   3.09
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31415.00 =    9450.00 FEET.

*********************************************************************
  FLOW PROCESS FROM NODE  31415.00 TO NODE  31416.00 IS CODE = 51
-------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    368.00  DOWNSTREAM(FEET) =    334.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1318.00   CHANNEL SLOPE = 0.0258
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.371
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp        Ap     SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         52.53      0.60      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.10
  AVERAGE FLOW DEPTH(FEET) =   0.80    TRAVEL TIME(MIN.) =   7.07
  Tc(MIN.) =   59.06
  SUBAREA AREA(ACRES) =     52.53       SUBAREA RUNOFF(CFS) =    0.00
  EFFECTIVE AREA(ACRES) =    419.00     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =       419.0         PEAK FLOW RATE(CFS) =     5.91
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.80   FLOW VELOCITY(FEET/SEC.) =   3.10
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31416.00 =   10768.00 FEET.

*********************************************************************
  FLOW PROCESS FROM NODE  31416.00 TO NODE  31417.00 IS CODE = 51
-------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    334.00  DOWNSTREAM(FEET) =    325.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1012.00   CHANNEL SLOPE = 0.0089
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
```

```
       MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
       *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.350
       SUBAREA LOSS RATE DATA(AMC  II):
        DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp        Ap      SCS
            LAND USE              GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
       USER-DEFINED                 -       16.45      0.60     1.000      -
       SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
       SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
       * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
       * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
       TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.91
       TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.08
       AVERAGE FLOW DEPTH(FEET) =   0.97   TRAVEL TIME(MIN.) =   8.09
       Tc(MIN.) =    67.15
       SUBAREA AREA(ACRES) =    16.45       SUBAREA RUNOFF(CFS) =    0.00
       EFFECTIVE AREA(ACRES) =    435.46     AREA-AVERAGED Fm(INCH/HR) =   0.60
       AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
       * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
       * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
       TOTAL AREA(ACRES) =       435.5         PEAK FLOW RATE(CFS) =      5.91
       NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE


       END OF SUBAREA CHANNEL FLOW HYDRAULICS:
       DEPTH(FEET) =  0.97   FLOW VELOCITY(FEET/SEC.) =   2.08
       LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31417.00 =   11780.00 FEET.

    *****************************************************************************
      FLOW PROCESS FROM NODE  31417.00 TO NODE  31418.00 IS CODE = 51
    -----------------------------------------------------------------------------
      >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
      >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
    =============================================================================
      ELEVATION DATA: UPSTREAM(FEET) =   325.00  DOWNSTREAM(FEET) =    301.00
      CHANNEL LENGTH THRU SUBAREA(FEET) = 1232.00   CHANNEL SLOPE =  0.0195
      CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
      *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.334
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp        Ap      SCS
           LAND USE              GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
      USER-DEFINED                 -       13.50      0.60     0.694      -
      USER-DEFINED                 -       32.00      0.60     1.000      -
      SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
      SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.909
      * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
      * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
      TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.53
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.86
      AVERAGE FLOW DEPTH(FEET) =   0.87   TRAVEL TIME(MIN.) =   7.18
      Tc(MIN.) =    74.33
      SUBAREA AREA(ACRES) =    45.50       SUBAREA RUNOFF(CFS) =    1.24
      EFFECTIVE AREA(ACRES) =    480.96     AREA-AVERAGED Fm(INCH/HR) =   0.59
      AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   0.99
      * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
      * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
      TOTAL AREA(ACRES) =       481.0         PEAK FLOW RATE(CFS) =      5.91
      NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) =  0.84   FLOW VELOCITY(FEET/SEC.) =   2.81
      LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31418.00 =   13012.00 FEET.
    =============================================================================
      END OF STUDY SUMMARY:
      TOTAL AREA(ACRES)       =        481.0  TC(MIN.) =       74.33
      EFFECTIVE AREA(ACRES)   =      480.96  AREA-AVERAGED Fm(INCH/HR)=   0.59
      AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap = 0.991
      PEAK FLOW RATE(CFS)     =         5.91
    =============================================================================
    =============================================================================
      END OF RATIONAL METHOD ANALYSIS
```

```
********************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                         Analysis prepared by:

                      Michael Baker International
                    5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 15 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 2-YR EV MARCH 2019 CCHIU                                            *
  *********************************************************************

   FILE NAME: X31502EV.DAT
   TIME/DATE OF STUDY: 07:57 03/26/2019
 ====================================================================
   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; 0.366
   10)   90.00; 0.300
   11)  120.00; 0.246
   12)  180.00; 0.190
   13)  360.00; 0.136
   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   60.0    30.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  2   50.0    25.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  3   40.0    20.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  4   30.0    15.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  5   20.0    10.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31500.00 TO NODE  31501.00 IS CODE =  21
 ------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   326.00
   ELEVATION DATA: UPSTREAM(FEET) =    416.00  DOWNSTREAM(FEET) =    379.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.043
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.014
   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
   "GRASS"                  -       0.66     0.60      1.000     0   11.04
   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) =       0.66   PEAK FLOW RATE(CFS) =       0.25


 ********************************************************************
   FLOW PROCESS FROM NODE  31501.00 TO NODE  31502.00 IS CODE =  51
 ------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =   375.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   179.00   CHANNEL SLOPE = 0.0223
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   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              -       0.74     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) =       0.36
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.46
   AVERAGE FLOW DEPTH(FEET) =  0.29   TRAVEL TIME(MIN.) =   2.05
   Tc(MIN.) =   13.09
   SUBAREA AREA(ACRES) =    0.74       SUBAREA RUNOFF(CFS) =    0.22
   EFFECTIVE AREA(ACRES) =     1.40      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       1.4        PEAK FLOW RATE(CFS) =       0.41

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
      DEPTH(FEET) =   0.30   FLOW VELOCITY(FEET/SEC.) =    1.51
      LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31502.00 =     505.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  31502.00 TO NODE  31503.00 IS CODE = 51
----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    375.00  DOWNSTREAM(FEET) =     374.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   151.00   CHANNEL SLOPE =  0.0066
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.827
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA        Fp         Ap     SCS
         LAND USE           GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        1.23      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) =       0.53
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.03
   AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =   2.45
   Tc(MIN.) =   15.55
   SUBAREA AREA(ACRES) =     1.23      SUBAREA RUNOFF(CFS) =    0.25
   EFFECTIVE AREA(ACRES) =     2.63     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) =       0.54

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   0.42   FLOW VELOCITY(FEET/SEC.) =    1.03
   LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31503.00 =     656.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  31503.00 TO NODE  31504.00 IS CODE = 51
----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    374.00  DOWNSTREAM(FEET) =     372.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   184.00   CHANNEL SLOPE =  0.0109
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.771
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA        Fp         Ap     SCS
         LAND USE           GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        2.17      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.) =   1.32
   AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =   2.33
   Tc(MIN.) =   17.87
   SUBAREA AREA(ACRES) =     2.17      SUBAREA RUNOFF(CFS) =    0.33
   EFFECTIVE AREA(ACRES) =     4.80     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      4.8         PEAK FLOW RATE(CFS) =       0.74
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   0.43   FLOW VELOCITY(FEET/SEC.) =    1.33
   LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31504.00 =     840.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31504.00 TO NODE  31505.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =     360.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   268.00   CHANNEL SLOPE =  0.0448
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.726
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA        Fp         Ap     SCS
         LAND USE           GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        2.94      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) =       0.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.39
   AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   1.87
   Tc(MIN.) =   19.74
   SUBAREA AREA(ACRES) =     2.94      SUBAREA RUNOFF(CFS) =    0.33
   EFFECTIVE AREA(ACRES) =     7.74     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      7.7         PEAK FLOW RATE(CFS) =       0.88

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   0.35   FLOW VELOCITY(FEET/SEC.) =    2.34
   LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31505.00 =    1108.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31505.00 TO NODE  31506.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    360.00  DOWNSTREAM(FEET) =     320.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   622.00   CHANNEL SLOPE =  0.0643
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.659
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA        Fp         Ap     SCS
         LAND USE           GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        6.03      0.60       0.984     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.07
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.86
   AVERAGE FLOW DEPTH(FEET) =   0.35   TRAVEL TIME(MIN.) =   3.63
   Tc(MIN.) =   23.37
   SUBAREA AREA(ACRES) =     6.03      SUBAREA RUNOFF(CFS) =    0.37
   EFFECTIVE AREA(ACRES) =    13.77     AREA-AVERAGED Fm(INCH/HR) =   0.60
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      13.8        PEAK FLOW RATE(CFS) =       0.88
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   FLOW VELOCITY(FEET/SEC.) =  2.77
  LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31506.00 =   1730.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE  31506.00 TO NODE  31507.00 IS CODE = 51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    320.00  DOWNSTREAM(FEET) =    315.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   391.00   CHANNEL SLOPE = 0.0128
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.606
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap       SCS
      LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        2.67      0.60      0.611     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.611
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  1.96
  AVERAGE FLOW DEPTH(FEET) =  0.45   TRAVEL TIME(MIN.) =  3.33
  Tc(MIN.) =  26.70
  SUBAREA AREA(ACRES) =    2.67       SUBAREA RUNOFF(CFS) =    0.58
  EFFECTIVE AREA(ACRES) =    16.43      AREA-AVERAGED Fm(INCH/HR) =   0.56
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.93
  TOTAL AREA(ACRES) =      16.4        PEAK FLOW RATE(CFS) =       0.88
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   FLOW VELOCITY(FEET/SEC.) =  1.84
  LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31507.00 =   2121.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE  31507.00 TO NODE  31508.00 IS CODE = 51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    315.00  DOWNSTREAM(FEET) =    313.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   427.00   CHANNEL SLOPE = 0.0047
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.550
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap       SCS
      LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       10.20      0.60      0.527     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
```

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  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.06
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  1.57
  AVERAGE FLOW DEPTH(FEET) =  0.66   TRAVEL TIME(MIN.) =  4.52
  Tc(MIN.) =  31.22
  SUBAREA AREA(ACRES) =    10.20       SUBAREA RUNOFF(CFS) =    2.39
  EFFECTIVE AREA(ACRES) =    26.63      AREA-AVERAGED Fm(INCH/HR) =   0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.78
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =      26.6        PEAK FLOW RATE(CFS) =       2.95

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.76   FLOW VELOCITY(FEET/SEC.) =  1.71
  LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31508.00 =   2548.00 FEET.

***********************************************************************************
  FLOW PROCESS FROM NODE  31508.00 TO NODE  31509.00 IS CODE = 51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    313.00  DOWNSTREAM(FEET) =    296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   495.00   CHANNEL SLOPE = 0.0343
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.534
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap       SCS
      LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        8.30      0.60      1.000     -
  USER-DEFINED              -       10.50      0.60      0.500     -
  USER-DEFINED              -        1.60      0.60      0.850     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.731
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.98
  AVERAGE FLOW DEPTH(FEET) =  0.60   TRAVEL TIME(MIN.) =  2.07
  Tc(MIN.) =  33.29
  SUBAREA AREA(ACRES) =    20.40       SUBAREA RUNOFF(CFS) =    2.64
  EFFECTIVE AREA(ACRES) =    47.03      AREA-AVERAGED Fm(INCH/HR) =   0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.76
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =      47.0        PEAK FLOW RATE(CFS) =       5.50

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.66   FLOW VELOCITY(FEET/SEC.) =  4.22
  LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31509.00 =   3043.00 FEET.
========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     47.0  TC(MIN.) =     33.29
  EFFECTIVE AREA(ACRES) =     47.03  AREA-AVERAGED Fm(INCH/HR)= 0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 0.757
  PEAK FLOW RATE(CFS)    =      5.50
========================================================================
========================================================================
```

END OF RATIONAL METHOD ANALYSIS

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

                    Michael Baker International
                   5 Hutton Centre Drive Suite 500
                       Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 16 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 2-YR EV MARCH 2019 CCHIU                                           *
 *********************************************************************

  FILE NAME: X31602EV.DAT
  TIME/DATE OF STUDY: 07:59 03/26/2019
================================================================================
  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;  0.366
  10)   90.00;  0.300
  11)  120.00;  0.246
  12)  180.00;  0.190
  13)  360.00;  0.136
  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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31600.00 TO NODE  31601.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
  ELEVATION DATA: UPSTREAM(FEET) =    672.00  DOWNSTREAM(FEET) =    582.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.296
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.136
  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
  "GRASS"                   -        0.52      0.60      1.000    0   9.30
  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) =       0.52   PEAK FLOW RATE(CFS) =       0.25


****************************************************************************
  FLOW PROCESS FROM NODE  31601.00 TO NODE  31602.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    582.00  DOWNSTREAM(FEET) =    554.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   229.00   CHANNEL SLOPE = 0.1223
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.035
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap    SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        1.33      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) =       0.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.99
  AVERAGE FLOW DEPTH(FEET) =  0.24   TRAVEL TIME(MIN.) =   1.27
  Tc(MIN.) =   10.57
  SUBAREA AREA(ACRES) =    1.33       SUBAREA RUNOFF(CFS) =    0.52
  EFFECTIVE AREA(ACRES) =      1.86      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       1.9        PEAK FLOW RATE(CFS) =       0.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.27   FLOW VELOCITY(FEET/SEC.) =   3.32
    LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31602.00 =    558.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31602.00 TO NODE  31603.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    554.00  DOWNSTREAM(FEET) =    545.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   149.00   CHANNEL SLOPE =  0.0604
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.998
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL) CN
   USER-DEFINED              -        2.68     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) =      1.21
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.92
   AVERAGE FLOW DEPTH(FEET) =  0.37    TRAVEL TIME(MIN.) =   0.85
   Tc(MIN.) =   11.42
   SUBAREA AREA(ACRES) =     2.68       SUBAREA RUNOFF(CFS) =    0.96
   EFFECTIVE AREA(ACRES) =    4.54     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        4.5         PEAK FLOW RATE(CFS) =      1.62

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   3.12
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31603.00 =    707.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31603.00 TO NODE  31604.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    525.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   184.00   CHANNEL SLOPE =  0.1087
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.965
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL) CN
   USER-DEFINED              -        3.07     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) =      2.13
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.13
   AVERAGE FLOW DEPTH(FEET) =  0.41    TRAVEL TIME(MIN.) =   0.74
   Tc(MIN.) =   12.16
   SUBAREA AREA(ACRES) =     3.07       SUBAREA RUNOFF(CFS) =    1.01
   EFFECTIVE AREA(ACRES) =    7.61     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        7.6         PEAK FLOW RATE(CFS) =      2.50
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.44   FLOW VELOCITY(FEET/SEC.) =   4.31
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31604.00 =    891.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  31604.00 TO NODE  31605.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =    495.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   266.00   CHANNEL SLOPE =  0.1128
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.923
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL) CN
   USER-DEFINED              -        4.69     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) =      3.18
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.65
   AVERAGE FLOW DEPTH(FEET) =  0.48    TRAVEL TIME(MIN.) =   0.95
   Tc(MIN.) =   13.12
   SUBAREA AREA(ACRES) =     4.69       SUBAREA RUNOFF(CFS) =    1.36
   EFFECTIVE AREA(ACRES) =   12.30     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       12.3         PEAK FLOW RATE(CFS) =      3.58

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   4.79
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31605.00 =   1157.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  31605.00 TO NODE  31606.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    495.00  DOWNSTREAM(FEET) =    470.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   444.00   CHANNEL SLOPE =  0.0563
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.840
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL) CN
   USER-DEFINED              -        8.98     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) =      4.55
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.91
   AVERAGE FLOW DEPTH(FEET) =  0.62    TRAVEL TIME(MIN.) =   1.89
   Tc(MIN.) =   15.01
   SUBAREA AREA(ACRES) =     8.98       SUBAREA RUNOFF(CFS) =    1.94
   EFFECTIVE AREA(ACRES) =   21.28     AREA-AVERAGED Fm(INCH/HR) =   0.60
```

```
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        21.3       PEAK FLOW RATE(CFS) =        4.59

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.62   FLOW VELOCITY(FEET/SEC.) =   3.95
  LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31606.00 =    1601.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31606.00 TO NODE  31607.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    439.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   763.00   CHANNEL SLOPE = 0.0406
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.758
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED              -        20.37     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) =       6.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.72
  AVERAGE FLOW DEPTH(FEET) =   0.74   TRAVEL TIME(MIN.) =   3.42
  Tc(MIN.) =   18.43
  SUBAREA AREA(ACRES) =     20.37      SUBAREA RUNOFF(CFS) =     2.89
  EFFECTIVE AREA(ACRES) =      41.65      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        41.6       PEAK FLOW RATE(CFS) =        5.92

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.73   FLOW VELOCITY(FEET/SEC.) =   3.71
  LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31607.00 =    2364.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31607.00 TO NODE  31608.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    439.00  DOWNSTREAM(FEET) =    380.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1396.00   CHANNEL SLOPE = 0.0423
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.640
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED              -        25.28     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) =       6.41
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.85
  AVERAGE FLOW DEPTH(FEET) =   0.74   TRAVEL TIME(MIN.) =   6.04
  Tc(MIN.) =   24.47
```

```
  SUBAREA AREA(ACRES) =      25.28      SUBAREA RUNOFF(CFS) =     0.90
  EFFECTIVE AREA(ACRES) =      66.93      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        66.9       PEAK FLOW RATE(CFS) =        5.92
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.73   FLOW VELOCITY(FEET/SEC.) =   3.73
  LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31608.00 =    3760.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31608.00 TO NODE  31609.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    380.00  DOWNSTREAM(FEET) =    350.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   715.00   CHANNEL SLOPE = 0.0420
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.593
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED              -        19.63     0.60      1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.73
  AVERAGE FLOW DEPTH(FEET) =   0.73   TRAVEL TIME(MIN.) =   3.20
  Tc(MIN.) =   27.67
  SUBAREA AREA(ACRES) =      19.63      SUBAREA RUNOFF(CFS) =     0.00
  EFFECTIVE AREA(ACRES) =      86.56      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        86.6       PEAK FLOW RATE(CFS) =        5.92
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.73   FLOW VELOCITY(FEET/SEC.) =   3.73
  LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31609.00 =    4475.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31609.00 TO NODE  31610.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    325.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   948.00   CHANNEL SLOPE = 0.0264
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.539
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
```

```
         LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED                -       17.36     0.60      1.000     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.92
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.16
   AVERAGE FLOW DEPTH(FEET) =  0.79   TRAVEL TIME(MIN.) =   5.01
   Tc(MIN.) =   32.67
   SUBAREA AREA(ACRES) =    17.36     SUBAREA RUNOFF(CFS) =    0.00
   EFFECTIVE AREA(ACRES) =   103.92     AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TOTAL AREA(ACRES) =      103.9        PEAK FLOW RATE(CFS) =     5.92
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.79   FLOW VELOCITY(FEET/SEC.) = 3.16
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31610.00 =   5423.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  31610.00 TO NODE  31611.00 IS CODE = 51
   ----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =    310.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1182.00   CHANNEL SLOPE = 0.0127
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.486
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp        Ap     SCS
         LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED                -       69.76     0.60      0.990     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.990
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.07
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.00
   AVERAGE FLOW DEPTH(FEET) =  0.82   TRAVEL TIME(MIN.) =   6.56
   Tc(MIN.) =   39.24
   SUBAREA AREA(ACRES) =    69.76     SUBAREA RUNOFF(CFS) =    0.31
   EFFECTIVE AREA(ACRES) =   173.68     AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TOTAL AREA(ACRES) =      173.7        PEAK FLOW RATE(CFS) =     5.92
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.81   FLOW VELOCITY(FEET/SEC.) = 2.98
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31611.00 =   6605.00 FEET.

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

```
   FLOW PROCESS FROM NODE  31611.00 TO NODE  31612.00 IS CODE = 51
   ----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    310.00  DOWNSTREAM(FEET) =    308.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  164.00   CHANNEL SLOPE = 0.0122
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.479
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp        Ap     SCS
         LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED                -       17.90     0.60      1.000     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.92
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.93
   AVERAGE FLOW DEPTH(FEET) =  0.82   TRAVEL TIME(MIN.) =   0.93
   Tc(MIN.) =   40.17
   SUBAREA AREA(ACRES) =    17.90     SUBAREA RUNOFF(CFS) =    0.00
   EFFECTIVE AREA(ACRES) =   191.58     AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TOTAL AREA(ACRES) =      191.6        PEAK FLOW RATE(CFS) =     5.92
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.82   FLOW VELOCITY(FEET/SEC.) = 2.93
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31612.00 =   6769.00 FEET.
   ================================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =      191.6  TC(MIN.) =     40.17
   EFFECTIVE AREA(ACRES) =   191.58  AREA-AVERAGED Fm(INCH/HR)= 0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 0.996
   PEAK FLOW RATE(CFS)    =        5.92
   ================================================================================
   ================================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
 _____
 ****************************************************************************
        RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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        Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                       Analysis prepared by:

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                        Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY ************************
 * RMV PA-3 WATERSHED 17A EXISTING CONDITION                          *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 2-YR EV MARCH 2019 CCHIU                                           *
 **********************************************************************

  FILE NAME: X17A02EV.DAT
  TIME/DATE OF STUDY: 14:34 03/25/2019
 ====================================================================
   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; 0.366
  10)   90.00; 0.300
  11)  120.00; 0.246
  12)  180.00; 0.190
  13)  360.00; 0.136
  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  60.0     30.0   0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  2  50.0     25.0   0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  3  40.0     20.0   0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  4  30.0     15.0   0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  5  20.0     10.0   0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31700.00 TO NODE  31701.00 IS CODE =  21
 --------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
  ELEVATION DATA: UPSTREAM(FEET) =   545.00  DOWNSTREAM(FEET) =    515.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.410
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.998
  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
  "GRASS"                    -       0.43     0.60     1.000     0  11.41
  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) =       0.43   PEAK FLOW RATE(CFS) =       0.15


 ****************************************************************************
  FLOW PROCESS FROM NODE  31701.00 TO NODE  31702.00 IS CODE =  51
 --------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   515.00  DOWNSTREAM(FEET) =    490.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   218.00   CHANNEL SLOPE = 0.1147
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.944
  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
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.21
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.96
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   1.23
  Tc(MIN.) =   12.64
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.12
  EFFECTIVE AREA(ACRES) =       0.83     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         0.8        PEAK FLOW RATE(CFS) =       0.26

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   3.14
  LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31702.00 =     539.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  31702.00 TO NODE  31703.00 IS CODE =  51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE = 0.0833
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.857
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        1.55     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) =       0.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.54
  AVERAGE FLOW DEPTH(FEET) =  0.24   TRAVEL TIME(MIN.) =  1.97
  Tc(MIN.) =  14.60
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =   0.36
  EFFECTIVE AREA(ACRES) =    2.38     AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      2.4        PEAK FLOW RATE(CFS) =      0.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   2.67
  LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31703.00 =     839.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  31703.00 TO NODE  31704.00 IS CODE =  51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =    462.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    83.00   CHANNEL SLOPE = 0.0361
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   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               -        2.59     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) =       0.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.17
  AVERAGE FLOW DEPTH(FEET) =  0.36   TRAVEL TIME(MIN.) =  0.64
  Tc(MIN.) =  15.24
  SUBAREA AREA(ACRES) =    2.59      SUBAREA RUNOFF(CFS) =   0.55
  EFFECTIVE AREA(ACRES) =    4.97     AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      5.0        PEAK FLOW RATE(CFS) =      1.05
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   2.27
  LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31704.00 =     922.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31704.00 TO NODE  31705.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    462.00  DOWNSTREAM(FEET) =    460.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    60.00   CHANNEL SLOPE = 0.0333
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.824
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        5.22     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) =       1.58
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.46
  AVERAGE FLOW DEPTH(FEET) =  0.46   TRAVEL TIME(MIN.) =  0.41
  Tc(MIN.) =  15.65
  SUBAREA AREA(ACRES) =    5.22      SUBAREA RUNOFF(CFS) =   1.06
  EFFECTIVE AREA(ACRES) =   10.19     AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =     10.2        PEAK FLOW RATE(CFS) =      2.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   2.66
  LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31705.00 =     982.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31705.00 TO NODE  31706.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    375.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   604.00   CHANNEL SLOPE = 0.1407
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.774
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        8.10     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) =       2.70
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.82
  AVERAGE FLOW DEPTH(FEET) =  0.43   TRAVEL TIME(MIN.) =  2.09
  Tc(MIN.) =  17.74
  SUBAREA AREA(ACRES) =    8.10      SUBAREA RUNOFF(CFS) =   1.27
  EFFECTIVE AREA(ACRES) =   18.29     AREA-AVERAGED Fm(INCH/HR) =  0.60
```

```
 AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        18.3        PEAK FLOW RATE(CFS) =        2.87

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.44   FLOW VELOCITY(FEET/SEC.) =   4.95
 LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31706.00 =    1586.00 FEET.
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        18.3  TC(MIN.) =     17.74
 EFFECTIVE AREA(ACRES) =      18.29  AREA-AVERAGED Fm(INCH/HR)=  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =        2.87
================================================================================
================================================================================
 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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                    Analysis prepared by:

                  Michael Baker International
                 5 Hutton Centre Drive Suite 500
                     Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 17B EXISTING CONDITION                          *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 2-YR EV MARCH 2019 CCHIU                                           *
 *********************************************************************

  FILE NAME: X17B02EV.DAT
  TIME/DATE OF STUDY: 14:37 03/25/2019
 ========================================================================
   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;  0.366
  10)   90.00;  0.300
  11)  120.00;  0.246
  12)  180.00;  0.190
  13)  360.00;  0.136
  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  60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31710.00 TO NODE  31711.00 IS CODE =  21
 ------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
   ELEVATION DATA: UPSTREAM(FEET) =    631.00  DOWNSTREAM(FEET) =    605.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.719
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.984
   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
   "CHAPARRAL,BROADLEAF"      -        0.32     0.60     1.000    0   11.72
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =       0.11
   TOTAL AREA(ACRES) =        0.32   PEAK FLOW RATE(CFS) =      0.11

 ***********************************************************************
   FLOW PROCESS FROM NODE  31711.00 TO NODE  31712.00 IS CODE =  51
 ------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    588.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    71.00    CHANNEL SLOPE = 0.2394
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.968
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp       Ap    SCS
      LAND USE              GROUP     (ACRES) (INCH/HR) (DECIMAL) CN
   USER-DEFINED                -        0.56     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) =       0.20
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.11
   AVERAGE FLOW DEPTH(FEET) =   0.15    TRAVEL TIME(MIN.) =    0.38
   Tc(MIN.) =   12.10
   SUBAREA AREA(ACRES) =      0.56       SUBAREA RUNOFF(CFS) =    0.19
   EFFECTIVE AREA(ACRES) =        0.88      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) =       0.29

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   3.34
   LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31712.00 =    391.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31712.00 TO NODE  31713.00 IS CODE = 51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    588.00  DOWNSTREAM(FEET) =    565.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   181.00   CHANNEL SLOPE = 0.1271
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.920
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         0.31     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) =        0.34
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.78
   AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   1.09
   Tc(MIN.) =   13.19
   SUBAREA AREA(ACRES) =     0.31      SUBAREA RUNOFF(CFS) =    0.09
   EFFECTIVE AREA(ACRES) =     1.20     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       0.34

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   2.78
   LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31713.00 =    572.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31713.00 TO NODE  31714.00 IS CODE = 51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =    545.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   185.00   CHANNEL SLOPE = 0.1081
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.874
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         1.36     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) =        0.51
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.93
   AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   1.05
   Tc(MIN.) =   14.24
   SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =    0.33
   EFFECTIVE AREA(ACRES) =     2.56     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) =       0.63
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   3.05
   LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31714.00 =    757.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31714.00 TO NODE  31715.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    531.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   128.00   CHANNEL SLOPE = 0.1094
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.846
   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
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        0.94
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.43
   AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =   0.62
   Tc(MIN.) =   14.86
   SUBAREA AREA(ACRES) =     2.80      SUBAREA RUNOFF(CFS) =    0.62
   EFFECTIVE AREA(ACRES) =     5.35     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        5.4        PEAK FLOW RATE(CFS) =       1.19

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   3.57
   LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31715.00 =    885.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31715.00 TO NODE  31716.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM(FEET) =    507.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE = 0.0889
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.814
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         5.95     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) =        1.76
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.67
   AVERAGE FLOW DEPTH(FEET) =   0.40   TRAVEL TIME(MIN.) =   1.22
   Tc(MIN.) =   16.08
   SUBAREA AREA(ACRES) =     5.95      SUBAREA RUNOFF(CFS) =    1.15
   EFFECTIVE AREA(ACRES) =    11.30     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) =      2.18


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   FLOW VELOCITY(FEET/SEC.) =  3.89
 LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31716.00 =   1155.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  31716.00 TO NODE  31717.00 IS CODE =  51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    507.00  DOWNSTREAM(FEET) =    400.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1020.00   CHANNEL SLOPE = 0.1049
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.723
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -         13.90     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) =     2.97
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.48
 AVERAGE FLOW DEPTH(FEET) =   0.47   TRAVEL TIME(MIN.) =   3.80
 Tc(MIN.) =  19.88
 SUBAREA AREA(ACRES) =    13.90       SUBAREA RUNOFF(CFS) =    1.54
 EFFECTIVE AREA(ACRES) =    25.20     AREA-AVERAGED Fm(INCH/HR) =   0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      25.2       PEAK FLOW RATE(CFS) =      2.79


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.46   FLOW VELOCITY(FEET/SEC.) =  4.38
 LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31717.00 =   2175.00 FEET.
===========================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)    =       25.2  TC(MIN.) =    19.88
 EFFECTIVE AREA(ACRES) =     25.20  AREA-AVERAGED Fm(INCH/HR)=  0.60
 AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)   =       2.79
===========================================================================
===========================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

                       Michael Baker International
                     5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 18 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 2-YR EV MARCH 2019 CCHIU                                           *
 **********************************************************************

  FILE NAME: X31802EV.DAT
  TIME/DATE OF STUDY: 08:07 03/26/2019
=====================================================================
   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;  0.366
  10)   90.00;  0.300
  11)  120.00;  0.246
  12)  180.00;  0.190
  13)  360.00;  0.136
  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   60.0     30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   50.0     25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3   40.0     20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4   30.0     15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5   20.0     10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31800.00 TO NODE  31801.00 IS CODE =  21
 ---------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =====================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
   ELEVATION DATA: UPSTREAM(FEET) =    729.00  DOWNSTREAM(FEET) =    630.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.120
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.155
   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.)
   NATURAL FAIR COVER
   "CHAPARRAL,BROADLEAF"       -       0.10     0.60      1.000    0    9.12
   NATURAL FAIR COVER
   "CHAPARRAL,NARROWLEAF"      -       0.10     0.60      1.000    0    9.12
   NATURAL FAIR COVER
   "OPEN BRUSH"               -       1.30     0.60      1.000    0    9.12
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.75
   TOTAL AREA(ACRES) =       1.50   PEAK FLOW RATE(CFS) =       0.75


 ***********************************************************************
   FLOW PROCESS FROM NODE  31801.00 TO NODE  31802.00 IS CODE =  51
 ---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    597.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   196.00    CHANNEL SLOPE = 0.1684
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      0.75
   FLOW VELOCITY(FEET/SEC.) =   3.80   FLOW DEPTH(FEET) =   0.26
   TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =    9.98
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31802.00 =    525.00 FEET.

 ***********************************************************************
   FLOW PROCESS FROM NODE  31802.00 TO NODE  31802.00 IS CODE =  81
 ---------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =====================================================================
   MAINLINE Tc(MIN.) =    9.98
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.062
   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                -        1.80      0.60     1.000     -
      USER-DEFINED                -        0.10      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) =    2.00    SUBAREA RUNOFF(CFS) =    0.83
      EFFECTIVE AREA(ACRES) =      3.50   AREA-AVERAGED Fm(INCH/HR) = 0.60
      AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.00
      TOTAL AREA(ACRES) =        3.5      PEAK FLOW RATE(CFS) =      1.46

*************************************************************************
   FLOW PROCESS FROM NODE  31802.00 TO NODE  31803.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    597.00  DOWNSTREAM(FEET) =     565.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 225.00   CHANNEL SLOPE = 0.1422
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       1.46
   FLOW VELOCITY(FEET/SEC.) =  4.19   FLOW DEPTH(FEET) =  0.34
   TRAVEL TIME(MIN.) =  0.90   Tc(MIN.) =   10.88
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31803.00 =      750.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31803.00 TO NODE  31803.00 IS CODE = 81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   10.88
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.021
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
           LAND USE         GROUP      (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED             -        2.10      0.60     1.000     -
      USER-DEFINED             -        0.20      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) =    2.30    SUBAREA RUNOFF(CFS) =    0.87
      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) =      2.20

*************************************************************************
   FLOW PROCESS FROM NODE  31803.00 TO NODE  31804.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =     530.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 228.00   CHANNEL SLOPE = 0.1535
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       2.20
   FLOW VELOCITY(FEET/SEC.) =  4.73   FLOW DEPTH(FEET) =  0.39
```

```
      TRAVEL TIME(MIN.) =  0.80   Tc(MIN.) =   11.68
      LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31804.00 =      978.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31804.00 TO NODE  31804.00 IS CODE = 81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   11.68
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.986
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
           LAND USE         GROUP      (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED             -        4.10      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) =    4.70    SUBAREA RUNOFF(CFS) =    1.63
      EFFECTIVE AREA(ACRES) =     10.50   AREA-AVERAGED Fm(INCH/HR) = 0.60
      AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.00
      TOTAL AREA(ACRES) =       10.5      PEAK FLOW RATE(CFS) =      3.65

*************************************************************************
   FLOW PROCESS FROM NODE  31804.00 TO NODE  31805.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    530.00  DOWNSTREAM(FEET) =     498.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 414.00   CHANNEL SLOPE = 0.0773
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       3.65
   FLOW VELOCITY(FEET/SEC.) =  4.19   FLOW DEPTH(FEET) =  0.54
   TRAVEL TIME(MIN.) =  1.65   Tc(MIN.) =   13.33
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31805.00 =     1392.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31805.00 TO NODE  31805.00 IS CODE = 81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   13.33
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.914
   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             -        5.70      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) =    6.70    SUBAREA RUNOFF(CFS) =    1.89
      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) =      4.86

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

```
   FLOW PROCESS FROM NODE  31805.00 TO NODE  31806.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    498.00  DOWNSTREAM(FEET) =    454.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE = 0.0649
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       4.86
   FLOW VELOCITY(FEET/SEC.) =  4.20   FLOW DEPTH(FEET) =   0.62
   TRAVEL TIME(MIN.) =  2.69   Tc(MIN.) =   16.02
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31806.00 =   2070.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE  31806.00 TO NODE  31806.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =   16.02
   *   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              -        2.10     0.60      1.000      -
   USER-DEFINED              -        0.40     0.60      1.000      -
   USER-DEFINED              -        7.90     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) =   10.40      SUBAREA RUNOFF(CFS) =    2.02
   EFFECTIVE AREA(ACRES) =     27.60   AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      27.6       PEAK FLOW RATE(CFS) =       5.36

*******************************************************************************
   FLOW PROCESS FROM NODE  31806.00 TO NODE  31819.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    454.00  DOWNSTREAM(FEET) =    410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   737.00   CHANNEL SLOPE = 0.0597
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       5.36
   FLOW VELOCITY(FEET/SEC.) =  4.19   FLOW DEPTH(FEET) =   0.65
   TRAVEL TIME(MIN.) =  2.93   Tc(MIN.) =   18.95
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31819.00 =   2807.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =   18.95
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.745
   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              -        0.30     0.60      1.000      -
   USER-DEFINED              -        5.60     0.60      1.000      -
   USER-DEFINED              -        0.50     0.60      1.000      -
   USER-DEFINED              -        0.30     0.60      1.000      -
   USER-DEFINED              -        6.30     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) =   13.70      SUBAREA RUNOFF(CFS) =    1.79
   EFFECTIVE AREA(ACRES) =     41.30   AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      41.3       PEAK FLOW RATE(CFS) =       5.40

*******************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =   18.95
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.745
   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      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.03
   EFFECTIVE AREA(ACRES) =     41.50   AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      41.5       PEAK FLOW RATE(CFS) =       5.43

*******************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 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.) =   18.95
   RAINFALL INTENSITY(INCH/HR) =   0.75
   AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =     41.50
   TOTAL STREAM AREA(ACRES) =      41.50
   PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.43

*******************************************************************************
   FLOW PROCESS FROM NODE  31810.00 TO NODE  31811.00 IS CODE =  21
-------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   395.00
   ELEVATION DATA: UPSTREAM(FEET) =    697.00  DOWNSTREAM(FEET) =    645.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

```
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.576
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.991
   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    11.58
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      0.14
   TOTAL AREA(ACRES) =       0.40    PEAK FLOW RATE(CFS) =       0.14

****************************************************************************
   FLOW PROCESS FROM NODE  31811.00 TO NODE  31812.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =     610.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  148.00   CHANNEL SLOPE = 0.2365
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       0.14
   FLOW VELOCITY(FEET/SEC.) =  2.91   FLOW DEPTH(FEET) =   0.13
   TRAVEL TIME(MIN.) =  0.85   Tc(MIN.) =   12.42
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31812.00 =    543.00 FEET.
****************************************************************************
   FLOW PROCESS FROM NODE  31812.00 TO NODE  31812.00 IS CODE = 81
----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   MAINLINE Tc(MIN.) =   12.42
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.953
   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      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.10
   EFFECTIVE AREA(ACRES) =      0.70   AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =         0.7      PEAK FLOW RATE(CFS) =      0.22

****************************************************************************
   FLOW PROCESS FROM NODE  31812.00 TO NODE  31813.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =     591.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  176.00   CHANNEL SLOPE = 0.1080
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       0.22
   FLOW VELOCITY(FEET/SEC.) =  2.33   FLOW DEPTH(FEET) =   0.18
   TRAVEL TIME(MIN.) =  1.26   Tc(MIN.) =   13.68
```

```
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31813.00 =    719.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31813.00 TO NODE  31813.00 IS CODE = 81
----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   MAINLINE Tc(MIN.) =   13.68
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.898
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp         Ap      SCS
       LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        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) =    1.10      SUBAREA RUNOFF(CFS) =    0.30
   EFFECTIVE AREA(ACRES) =      1.80   AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =         1.8      PEAK FLOW RATE(CFS) =      0.48

****************************************************************************
   FLOW PROCESS FROM NODE  31813.00 TO NODE  31814.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    591.00  DOWNSTREAM(FEET) =    576.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  184.00   CHANNEL SLOPE = 0.0815
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       0.48
   FLOW VELOCITY(FEET/SEC.) =  2.60   FLOW DEPTH(FEET) =   0.25
   TRAVEL TIME(MIN.) =  1.18   Tc(MIN.) =   14.86
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31814.00 =    903.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31814.00 TO NODE  31814.00 IS CODE = 81
----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   MAINLINE Tc(MIN.) =   14.86
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.846
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp         Ap      SCS
       LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        3.50      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) =    3.50      SUBAREA RUNOFF(CFS) =    0.78
   EFFECTIVE AREA(ACRES) =      5.30   AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =         5.3      PEAK FLOW RATE(CFS) =      1.18

****************************************************************************
   FLOW PROCESS FROM NODE  31814.00 TO NODE  31815.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    576.00  DOWNSTREAM(FEET) =     566.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  120.00   CHANNEL SLOPE = 0.0833
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.18
  FLOW VELOCITY(FEET/SEC.) =  3.23   FLOW DEPTH(FEET) =  0.35
  TRAVEL TIME(MIN.) =   0.62   Tc(MIN.) =   15.48
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31815.00 =   1023.00 FEET.


*******************************************************************************
  FLOW PROCESS FROM NODE  31815.00 TO NODE  31815.00 IS CODE = 81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   15.48
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.829
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        3.10     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) =   3.10     SUBAREA RUNOFF(CFS) =    0.64
  EFFECTIVE AREA(ACRES) =       8.40   AREA-AVERAGED Fm(INCH/HR) = 0.60
  AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      1.73
*******************************************************************************
  FLOW PROCESS FROM NODE  31815.00 TO NODE  31816.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    566.00  DOWNSTREAM(FEET) =     544.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.1009
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.73
  FLOW VELOCITY(FEET/SEC.) =  3.86   FLOW DEPTH(FEET) =  0.39
  TRAVEL TIME(MIN.) =   0.94   Tc(MIN.) =   16.42
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31816.00 =   1241.00 FEET.


*******************************************************************************
  FLOW PROCESS FROM NODE  31816.00 TO NODE  31816.00 IS CODE = 81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   16.42
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.806
  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              -        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) =   5.80     SUBAREA RUNOFF(CFS) =    1.08
```

```
  EFFECTIVE AREA(ACRES) =      14.20   AREA-AVERAGED Fm(INCH/HR) = 0.60
  AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =       14.2       PEAK FLOW RATE(CFS) =      2.63
*******************************************************************************
  FLOW PROCESS FROM NODE  31816.00 TO NODE  31817.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    544.00  DOWNSTREAM(FEET) =     488.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  668.00   CHANNEL SLOPE = 0.0838
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.63
  FLOW VELOCITY(FEET/SEC.) =  3.97   FLOW DEPTH(FEET) =  0.47
  TRAVEL TIME(MIN.) =   2.80   Tc(MIN.) =   19.22
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31817.00 =   1909.00 FEET.


*******************************************************************************
  FLOW PROCESS FROM NODE  31817.00 TO NODE  31817.00 IS CODE = 81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   19.22
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.739
  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              -       12.40     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) =  12.50     SUBAREA RUNOFF(CFS) =    1.56
  EFFECTIVE AREA(ACRES) =      26.70   AREA-AVERAGED Fm(INCH/HR) = 0.60
  AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =       26.7       PEAK FLOW RATE(CFS) =      3.34
*******************************************************************************
  FLOW PROCESS FROM NODE  31817.00 TO NODE  31818.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    488.00  DOWNSTREAM(FEET) =     442.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  580.00   CHANNEL SLOPE = 0.0793
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.34
  FLOW VELOCITY(FEET/SEC.) =  4.09   FLOW DEPTH(FEET) =  0.52
  TRAVEL TIME(MIN.) =   2.37   Tc(MIN.) =   21.59
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31818.00 =   2489.00 FEET.


*******************************************************************************
  FLOW PROCESS FROM NODE  31818.00 TO NODE  31818.00 IS CODE = 81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
```

```
    MAINLINE Tc(MIN.) =   21.59
    *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.691
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED               -        2.60       0.60     1.000     -
    USER-DEFINED               -       14.90       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) =   17.50     SUBAREA RUNOFF(CFS) =    1.44
    EFFECTIVE AREA(ACRES) =    44.20   AREA-AVERAGED Fm(INCH/HR) =  0.60
    AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =      44.2      PEAK FLOW RATE(CFS) =       3.64
********************************************************************
  FLOW PROCESS FROM NODE  31818.00 TO NODE  31819.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   442.00  DOWNSTREAM(FEET) =    410.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  646.00   CHANNEL SLOPE = 0.0495
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =    3.64
  FLOW VELOCITY(FEET/SEC.) =   3.55   FLOW DEPTH(FEET) =   0.58
  TRAVEL TIME(MIN.) =   3.03   Tc(MIN.) =   24.62
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31819.00 =   3135.00 FEET.

********************************************************************
  FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE = 81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   24.62
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.637
  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               -        0.80       0.60     1.000     -
  USER-DEFINED               -        7.10       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) =    8.20     SUBAREA RUNOFF(CFS) =    0.27
  EFFECTIVE AREA(ACRES) =    52.40   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       52.4      PEAK FLOW RATE(CFS) =       3.64
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

********************************************************************
  FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 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.) =   24.62
    RAINFALL INTENSITY(INCH/HR) =   0.64
    AREA-AVERAGED Fm(INCH/HR) =  0.60
    AREA-AVERAGED Fp(INCH/HR) =  0.60
    AREA-AVERAGED Ap =  1.00
    EFFECTIVE STREAM AREA(ACRES) =     52.40
    TOTAL STREAM AREA(ACRES) =      52.40
    PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.64

    ** CONFLUENCE DATA **
    STREAM     Q      Tc    Intensity  Fp(Fm)     Ap    Ae     HEADWATER
    NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
      1       5.43   18.95   0.745   0.60( 0.60) 1.00    41.5   31800.00
      2       3.64   24.62   0.637   0.60( 0.60) 1.00    52.4   31810.00

    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       9.07   18.95   0.745   0.60( 0.60) 1.00    81.8   31800.00
      2       5.03   24.62   0.637   0.60( 0.60) 1.00    93.9   31810.00

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =       9.07    Tc(MIN.) =    18.95
    EFFECTIVE AREA(ACRES) =       81.84   AREA-AVERAGED Fm(INCH/HR) =  0.60
    AREA-AVERAGED Fp(INCH/HR) =  0.60   AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        93.9
    LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31819.00 =   3135.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  31819.00 TO NODE  31820.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   410.00  DOWNSTREAM(FEET) =    363.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1134.00   CHANNEL SLOPE = 0.0414
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.07
  FLOW VELOCITY(FEET/SEC.) =   4.17   FLOW DEPTH(FEET) =   0.85
  TRAVEL TIME(MIN.) =   4.53   Tc(MIN.) =   23.48
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31820.00 =   4269.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  31820.00 TO NODE  31820.00 IS CODE = 81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   23.48
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.657
  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               -        2.30       0.60     1.000     -
```

```
 USER-DEFINED              -      1.70    0.60    1.000     -
 USER-DEFINED              -      3.30    0.60    1.000     -
 USER-DEFINED              -      2.50    0.60    1.000     -
 USER-DEFINED              -      8.50    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) =   18.70    SUBAREA RUNOFF(CFS) =    0.97
 EFFECTIVE AREA(ACRES) =    100.54   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =     112.6       PEAK FLOW RATE(CFS) =        9.07
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****************************************************************************
  FLOW PROCESS FROM NODE  31820.00 TO NODE  31820.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
  MAINLINE Tc(MIN.) =   23.48
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.657
  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              -      0.80    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) =    1.50    SUBAREA RUNOFF(CFS) =    0.08
  EFFECTIVE AREA(ACRES) =    102.04   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =     114.1       PEAK FLOW RATE(CFS) =        9.07
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****************************************************************************
  FLOW PROCESS FROM NODE  31820.00 TO NODE  31821.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    363.00  DOWNSTREAM(FEET) =    325.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   614.00    CHANNEL SLOPE = 0.0619
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =        9.07
  FLOW VELOCITY(FEET/SEC.) =   4.84    FLOW DEPTH(FEET) =   0.79
  TRAVEL TIME(MIN.) =   2.12    Tc(MIN.) =    25.60
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31821.00 =   4883.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31821.00 TO NODE  31821.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
  MAINLINE Tc(MIN.) =   25.60
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.622
  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              -      1.40    0.60    1.000     -
 USER-DEFINED              -      0.90    0.60    1.000     -
 USER-DEFINED              -      1.00    0.60    1.000     -
 USER-DEFINED              -      0.50    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) =    4.50    SUBAREA RUNOFF(CFS) =    0.09
 EFFECTIVE AREA(ACRES) =    106.54   AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =     118.6       PEAK FLOW RATE(CFS) =        9.07
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****************************************************************************
  FLOW PROCESS FROM NODE  31821.00 TO NODE  31821.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
  MAINLINE Tc(MIN.) =   25.60
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.622
  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     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.20    SUBAREA RUNOFF(CFS) =    0.00
  EFFECTIVE AREA(ACRES) =    106.74   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =     118.8       PEAK FLOW RATE(CFS) =        9.07
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
===========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES) =        118.8   TC(MIN.) =      25.60
  EFFECTIVE AREA(ACRES) =    106.74  AREA-AVERAGED Fm(INCH/HR)=  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)  =        9.07

  ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc   Intensity  Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
    1       9.07   25.60    0.622   0.60( 0.60) 1.00    106.7   31800.00
    2       5.03   32.36    0.541   0.60( 0.60) 1.00    118.8   31810.00
===========================================================================
===========================================================================
  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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                          Santa Ana, CA92707


  *************************** DESCRIPTION OF STUDY **************************
* RMV PA-4 WATERSHED 2 EXISTING CONDITION                                   *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL                                     *
* 2-YR EV MARCH 2019 CCHIU                                                  *
  **********************************************************************

  FILE NAME: X40202EV.DAT
  TIME/DATE OF STUDY: 08:12 03/26/2019
================================================================================
   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;  0.366
  10)   90.00;  0.300
  11)  120.00;  0.246
  12)  180.00;  0.190
  13)  360.00;  0.136
  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   60.0    30.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40200.00 TO NODE  40201.00 IS CODE =  21
-------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   319.00
  ELEVATION DATA: UPSTREAM(FEET) =    647.00  DOWNSTREAM(FEET) =    555.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.085
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.159
  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
  "CHAPARRAL,BROADLEAF"     -        0.30     0.60      1.000    0    9.08
  NATURAL FAIR COVER
  "OPEN BRUSH"             -        0.20     0.60      1.000    0    9.08
  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) =       0.50   PEAK FLOW RATE(CFS) =      0.25


********************************************************************************
  FLOW PROCESS FROM NODE  40201.00 TO NODE  40202.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    555.00  DOWNSTREAM(FEET) =    525.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00    CHANNEL SLOPE = 0.2000
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.25
  FLOW VELOCITY(FEET/SEC.) =   3.08   FLOW DEPTH(FEET) =   0.16
  TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =    9.90
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40202.00 =    469.00 FEET.


********************************************************************************
  FLOW PROCESS FROM NODE  40202.00 TO NODE  40202.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =    9.90
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.071
  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             -        0.10      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) =    0.70      SUBAREA RUNOFF(CFS) =    0.30
   EFFECTIVE AREA(ACRES) =      1.20   AREA-AVERAGED Fm(INCH/HR) = 0.60
   AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        1.2      PEAK FLOW RATE(CFS) =       0.51

 *****************************************************************************
   FLOW PROCESS FROM NODE  40202.00 TO NODE  40203.00 IS CODE =  51
 ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =     505.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE = 0.1143
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       0.51
   FLOW VELOCITY(FEET/SEC.) =  2.96   FLOW DEPTH(FEET) =   0.24
   TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =   10.88
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40203.00 =     644.00 FEET.

 *****************************************************************************
   FLOW PROCESS FROM NODE  40203.00 TO NODE  40203.00 IS CODE =  81
 ----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
   MAINLINE Tc(MIN.) =   10.88
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.021
   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             -        0.10      0.60      1.000      -
   USER-DEFINED             -        0.40      0.60      1.000      -
   USER-DEFINED             -        0.10      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) =    0.70      SUBAREA RUNOFF(CFS) =    0.27
   EFFECTIVE AREA(ACRES) =      1.90   AREA-AVERAGED Fm(INCH/HR) = 0.60
   AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        1.9      PEAK FLOW RATE(CFS) =       0.72

 *****************************************************************************
   FLOW PROCESS FROM NODE  40203.00 TO NODE  40204.00 IS CODE =  51
 ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    505.00  DOWNSTREAM(FEET) =     493.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.0550
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       0.72
   FLOW VELOCITY(FEET/SEC.) =  2.41   FLOW DEPTH(FEET) =   0.32
```

```
   TRAVEL TIME(MIN.) =   1.51   Tc(MIN.) =   12.39
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40204.00 =     862.00 FEET.

 *****************************************************************************
   FLOW PROCESS FROM NODE  40204.00 TO NODE  40204.00 IS CODE =  81
 ----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
   MAINLINE Tc(MIN.) =   12.39
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.955
   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             -        0.10      0.60      1.000      -
   USER-DEFINED             -        0.30      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) =    1.40      SUBAREA RUNOFF(CFS) =    0.45
   EFFECTIVE AREA(ACRES) =      3.30   AREA-AVERAGED Fm(INCH/HR) = 0.60
   AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        3.3      PEAK FLOW RATE(CFS) =       1.05

 *****************************************************************************
   FLOW PROCESS FROM NODE  40204.00 TO NODE  40205.00 IS CODE =  51
 ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    493.00  DOWNSTREAM(FEET) =     472.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.0963
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       1.05
   FLOW VELOCITY(FEET/SEC.) =  3.32   FLOW DEPTH(FEET) =   0.33
   TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =   13.48
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40205.00 =    1080.00 FEET.

 *****************************************************************************
   FLOW PROCESS FROM NODE  40205.00 TO NODE  40205.00 IS CODE =  81
 ----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
   MAINLINE Tc(MIN.) =   13.48
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.907
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp          Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -        0.20      0.60      1.000      -
   USER-DEFINED             -        0.10      0.60      1.000      -
   USER-DEFINED             -        0.30      0.60      1.000      -
   USER-DEFINED             -        1.30      0.60      1.000      -
   USER-DEFINED             -        0.20      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) =    0.58
   EFFECTIVE AREA(ACRES) =      5.40   AREA-AVERAGED Fm(INCH/HR) = 0.60
```

```
  AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =       5.4     PEAK FLOW RATE(CFS) =       1.49


*************************************************************************
  FLOW PROCESS FROM NODE  40205.00 TO NODE  40206.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   472.00  DOWNSTREAM(FEET) =    455.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   71.00   CHANNEL SLOPE = 0.2394
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.49
  FLOW VELOCITY(FEET/SEC.) =   5.18   FLOW DEPTH(FEET) =   0.31
  TRAVEL TIME(MIN.) =   0.23   Tc(MIN.) =   13.71
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40206.00 =   1151.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40206.00 TO NODE  40206.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
  MAINLINE Tc(MIN.) =   13.71
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.897
  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              -         0.30      0.60     1.000      -
  USER-DEFINED              -         0.20      0.60     1.000      -
  USER-DEFINED              -         1.10      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) =      3.80      SUBAREA RUNOFF(CFS) =     1.02
  EFFECTIVE AREA(ACRES) =      9.20   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =       9.2     PEAK FLOW RATE(CFS) =       2.46

*************************************************************************
  FLOW PROCESS FROM NODE  40206.00 TO NODE  40207.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   455.00  DOWNSTREAM(FEET) =    400.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE = 0.1389
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.46
  FLOW VELOCITY(FEET/SEC.) =   4.72   FLOW DEPTH(FEET) =   0.42
  TRAVEL TIME(MIN.) =   1.40   Tc(MIN.) =   15.11
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40207.00 =   1547.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40207.00 TO NODE  40207.00 IS CODE =  81
-------------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
  MAINLINE Tc(MIN.) =   15.11
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.837
  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              -         0.20      0.60     1.000      -
  USER-DEFINED              -         1.10      0.60     1.000      -
  USER-DEFINED              -         0.90      0.60     1.000      -
  USER-DEFINED              -         2.90      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) =      6.30      SUBAREA RUNOFF(CFS) =     1.35
  EFFECTIVE AREA(ACRES) =     15.50   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =      15.5     PEAK FLOW RATE(CFS) =       3.31

*************************************************************************
  FLOW PROCESS FROM NODE  40207.00 TO NODE  40208.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   400.00  DOWNSTREAM(FEET) =    384.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   452.00   CHANNEL SLOPE = 0.0354
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.030  MAXIMUM DEPTH(FEET) = 2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.31
  FLOW VELOCITY(FEET/SEC.) =   3.80   FLOW DEPTH(FEET) =   0.54
  TRAVEL TIME(MIN.) =   1.98   Tc(MIN.) =   17.09
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40208.00 =   1999.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
  MAINLINE Tc(MIN.) =   17.09
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.790
  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              -         0.90      0.60     1.000      -
  USER-DEFINED              -         1.70      0.60     1.000      -
  USER-DEFINED              -         0.10      0.60     1.000      -
  USER-DEFINED              -         0.20      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) =      3.00      SUBAREA RUNOFF(CFS) =     0.51
  EFFECTIVE AREA(ACRES) =     18.50   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =      18.5     PEAK FLOW RATE(CFS) =       3.31
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
***********************************************************************
  FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
-----------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=======================================================================
  MAINLINE Tc(MIN.) =   17.09
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.790
  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               -        1.30     0.60     1.000      -
  USER-DEFINED               -        1.60     0.60     1.000      -
  USER-DEFINED               -        0.90     0.60     1.000      -
  USER-DEFINED               -        2.10     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) =    7.20     SUBAREA RUNOFF(CFS) =    1.23
  EFFECTIVE AREA(ACRES) =     25.70   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      25.7        PEAK FLOW RATE(CFS) =      4.39

***********************************************************************
  FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
-----------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=======================================================================
  MAINLINE Tc(MIN.) =   17.09
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.790
  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               -        0.20     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) =    2.80     SUBAREA RUNOFF(CFS) =    0.48
  EFFECTIVE AREA(ACRES) =     28.50   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      28.5        PEAK FLOW RATE(CFS) =      4.87


***********************************************************************
  FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
-----------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=======================================================================
  MAINLINE Tc(MIN.) =   17.09
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.790
  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     0.100      -
  USER-DEFINED               -        0.10     0.60     0.500      -
  USER-DEFINED               -        1.60     0.60     1.000      -
  USER-DEFINED               -        1.20     0.60     1.000      -
  USER-DEFINED               -        0.20     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 =  0.852
  SUBAREA AREA(ACRES) =    4.60     SUBAREA RUNOFF(CFS) =    1.15
  EFFECTIVE AREA(ACRES) =     33.10   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      33.1        PEAK FLOW RATE(CFS) =      6.03

***********************************************************************
  FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
-----------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=======================================================================
  MAINLINE Tc(MIN.) =   17.09
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.790
  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) =    0.07
  EFFECTIVE AREA(ACRES) =     33.50   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      33.5        PEAK FLOW RATE(CFS) =      6.09
=======================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =       33.5  TC(MIN.) =     17.09
  EFFECTIVE AREA(ACRES) =     33.50   AREA-AVERAGED Fm(INCH/HR)=  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.980
  PEAK FLOW RATE(CFS)    =        6.09
=======================================================================

=======================================================================
  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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                         Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-4 WATERSHED 3 EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 2-YR EV MARCH 2019 CCHIU                                              *
 ****************************************************************************

  FILE NAME: X40302EV.DAT
  TIME/DATE OF STUDY: 08:31 03/26/2019
================================================================================
  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; 0.366
  10)   90.00; 0.300
  11)  120.00; 0.246
  12)  180.00; 0.190
  13)  360.00; 0.136
  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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40300.00 TO NODE  40301.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
  ELEVATION DATA: UPSTREAM(FEET) =    790.00  DOWNSTREAM(FEET) =    720.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.541
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.110
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap     SCS   Tc
      LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "CHAPARRAL,BROADLEAF"      -        0.39    0.60     1.000     0    9.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =       0.39   PEAK FLOW RATE(CFS) =       0.18


********************************************************************************
  FLOW PROCESS FROM NODE  40301.00 TO NODE  40302.00 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    675.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   191.00   CHANNEL SLOPE = 0.2356
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.039
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        0.88    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) =      0.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.44
  AVERAGE FLOW DEPTH(FEET) =   0.19    TRAVEL TIME(MIN.) =   0.93
  Tc(MIN.) =   10.47
  SUBAREA AREA(ACRES) =     0.88       SUBAREA RUNOFF(CFS) =    0.35
  EFFECTIVE AREA(ACRES) =     1.28      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) =       0.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.21    FLOW VELOCITY(FEET/SEC.) =   3.86
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40302.00 =    507.00 FEET.


************************************************************************
   FLOW PROCESS FROM NODE  40302.00 TO NODE  40303.00 IS CODE = 51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =     625.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   179.00   CHANNEL SLOPE = 0.2793
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.009
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         0.84       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) =      0.66
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.38
   AVERAGE FLOW DEPTH(FEET) =  0.22    TRAVEL TIME(MIN.) =   0.68
   Tc(MIN.) =  11.15
   SUBAREA AREA(ACRES) =    0.84       SUBAREA RUNOFF(CFS) =    0.31
   EFFECTIVE AREA(ACRES) =     2.12     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      2.1         PEAK FLOW RATE(CFS) =      0.78

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.24    FLOW VELOCITY(FEET/SEC.) =   4.54
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40303.00 =    686.00 FEET.


************************************************************************
   FLOW PROCESS FROM NODE  40303.00 TO NODE  40304.00 IS CODE = 51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    625.00  DOWNSTREAM(FEET) =     557.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   161.00   CHANNEL SLOPE = 0.4224
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.990
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         2.94       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) =      1.30
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.19
   AVERAGE FLOW DEPTH(FEET) =  0.26    TRAVEL TIME(MIN.) =   0.43
   Tc(MIN.) =  11.58
   SUBAREA AREA(ACRES) =    2.94       SUBAREA RUNOFF(CFS) =    1.03
   EFFECTIVE AREA(ACRES) =     5.06     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      5.1         PEAK FLOW RATE(CFS) =      1.78
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.30    FLOW VELOCITY(FEET/SEC.) =   6.56
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40304.00 =    847.00 FEET.


*****************************************************************************
   FLOW PROCESS FROM NODE  40304.00 TO NODE  40305.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    557.00  DOWNSTREAM(FEET) =    548.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    42.00   CHANNEL SLOPE = 0.2143
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -         1.68       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) =      2.07
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.27
   AVERAGE FLOW DEPTH(FEET) =  0.36    TRAVEL TIME(MIN.) =   0.13
   Tc(MIN.) =  11.71
   SUBAREA AREA(ACRES) =     1.68       SUBAREA RUNOFF(CFS) =    0.58
   EFFECTIVE AREA(ACRES) =     6.73     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      6.7         PEAK FLOW RATE(CFS) =      2.33

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.38    FLOW VELOCITY(FEET/SEC.) =   5.48
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40305.00 =    889.00 FEET.


*****************************************************************************
   FLOW PROCESS FROM NODE  40305.00 TO NODE  40306.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    548.00  DOWNSTREAM(FEET) =    515.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   217.00   CHANNEL SLOPE = 0.1521
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.953
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         4.67       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) =      3.08
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.13
   AVERAGE FLOW DEPTH(FEET) =  0.45    TRAVEL TIME(MIN.) =   0.71
   Tc(MIN.) =  12.42
   SUBAREA AREA(ACRES) =     4.67       SUBAREA RUNOFF(CFS) =    1.49
   EFFECTIVE AREA(ACRES) =    11.41     AREA-AVERAGED Fm(INCH/HR) =   0.60
```

```
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      11.4        PEAK FLOW RATE(CFS) =       3.63

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.48   FLOW VELOCITY(FEET/SEC.) =   5.34
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40306.00 =    1106.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40306.00 TO NODE  40307.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    515.00  DOWNSTREAM(FEET) =    502.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE = 0.0722
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.923
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        8.44     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) =      4.86
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.39
   AVERAGE FLOW DEPTH(FEET) =   0.61   TRAVEL TIME(MIN.) =   0.68
   Tc(MIN.) =   13.10
   SUBAREA AREA(ACRES) =      8.44       SUBAREA RUNOFF(CFS) =    2.46
   EFFECTIVE AREA(ACRES) =     19.84     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      19.8        PEAK FLOW RATE(CFS) =       5.78

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.65   FLOW VELOCITY(FEET/SEC.) =   4.54
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40307.00 =    1286.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40307.00 TO NODE  40308.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    502.00  DOWNSTREAM(FEET) =    469.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   553.00   CHANNEL SLOPE = 0.0597
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.835
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -       10.07     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) =      6.85
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.40
   AVERAGE FLOW DEPTH(FEET) =   0.72   TRAVEL TIME(MIN.) =   2.09
   Tc(MIN.) =   15.20
```

```
   SUBAREA AREA(ACRES) =      10.07      SUBAREA RUNOFF(CFS) =    2.13
   EFFECTIVE AREA(ACRES) =     29.92     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      29.9        PEAK FLOW RATE(CFS) =       6.34

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.70   FLOW VELOCITY(FEET/SEC.) =   4.35
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40308.00 =    1839.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40308.00 TO NODE  40309.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    469.00  DOWNSTREAM(FEET) =    433.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   631.00   CHANNEL SLOPE = 0.0571
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.777
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        9.09     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) =      7.07
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.36
   AVERAGE FLOW DEPTH(FEET) =   0.74   TRAVEL TIME(MIN.) =   2.41
   Tc(MIN.) =   17.61
   SUBAREA AREA(ACRES) =      9.09       SUBAREA RUNOFF(CFS) =    1.45
   EFFECTIVE AREA(ACRES) =     39.01     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      39.0        PEAK FLOW RATE(CFS) =       6.34
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.70   FLOW VELOCITY(FEET/SEC.) =   4.25
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40309.00 =    2470.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40309.00 TO NODE  40310.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    433.00  DOWNSTREAM(FEET) =    406.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   595.00   CHANNEL SLOPE = 0.0454
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.719
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -       11.61     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) =      6.96
```

```
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.02
   AVERAGE FLOW DEPTH(FEET) =  0.76   TRAVEL TIME(MIN.) =   2.47
   Tc(MIN.) =   20.08
   SUBAREA AREA(ACRES) =    11.61      SUBAREA RUNOFF(CFS) =    1.24
   EFFECTIVE AREA(ACRES) =    50.62     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       50.6      PEAK FLOW RATE(CFS) =       6.34
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.74   FLOW VELOCITY(FEET/SEC.) =   3.91
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40310.00 =   3065.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40310.00 TO NODE  40311.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    406.00  DOWNSTREAM(FEET) =    353.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1122.00   CHANNEL SLOPE = 0.0472
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.652
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap       SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -        15.32      0.60      0.897      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.897
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.13
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.08
   AVERAGE FLOW DEPTH(FEET) =  0.68   TRAVEL TIME(MIN.) =   3.68
   Tc(MIN.) =   23.76
   SUBAREA AREA(ACRES) =    15.32      SUBAREA RUNOFF(CFS) =    1.58
   EFFECTIVE AREA(ACRES) =    65.94     AREA-AVERAGED Fm(INCH/HR) =   0.59
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  0.98
   TOTAL AREA(ACRES) =       65.9      PEAK FLOW RATE(CFS) =       6.34
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.65   FLOW VELOCITY(FEET/SEC.) =   4.95
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40311.00 =   4187.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40311.00 TO NODE  40312.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    353.00  DOWNSTREAM(FEET) =    337.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  712.00   CHANNEL SLOPE = 0.0225
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.604
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap       SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
```

```
   USER-DEFINED            -         7.65      0.60      0.850      -
   USER-DEFINED            -         4.40      0.60      1.000      -
   USER-DEFINED            -         0.89      0.60      0.100      -
   USER-DEFINED            -         6.82      0.60      0.850      -
   USER-DEFINED            -         5.04      0.60      1.000      -
   USER-DEFINED            -         1.11      0.60      1.000      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.885
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.20
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.86
   AVERAGE FLOW DEPTH(FEET) =  0.79   TRAVEL TIME(MIN.) =   3.08
   Tc(MIN.) =   26.83
   SUBAREA AREA(ACRES) =    25.91      SUBAREA RUNOFF(CFS) =    1.71
   EFFECTIVE AREA(ACRES) =    91.85     AREA-AVERAGED Fm(INCH/HR) =   0.57
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  0.95
   TOTAL AREA(ACRES) =       91.8      PEAK FLOW RATE(CFS) =       6.34
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.75   FLOW VELOCITY(FEET/SEC.) =   3.73
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40312.00 =   4899.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   26.83
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.604
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap       SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -         0.04      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) =     0.04      SUBAREA RUNOFF(CFS) =    0.00
   EFFECTIVE AREA(ACRES) =    91.89   AREA-AVERAGED Fm(INCH/HR) = 0.57
   AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 0.95
   TOTAL AREA(ACRES) =       91.9      PEAK FLOW RATE(CFS) =       6.34
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*************************************************************************
   FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   26.83
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.604
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap       SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -         1.17      0.60      0.850      -
   USER-DEFINED            -         0.01      0.60      1.000      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.851
   SUBAREA AREA(ACRES) =     1.18      SUBAREA RUNOFF(CFS) =    0.10
   EFFECTIVE AREA(ACRES) =    93.07   AREA-AVERAGED Fm(INCH/HR) = 0.57
   AREA-AVERAGED Fp(INCH/HR) = 0.60  AREA-AVERAGED Ap = 0.95
```

```
     TOTAL AREA(ACRES) =        93.1       PEAK FLOW RATE(CFS) =        6.34
     NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.83
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.604
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL     AREA       Fp         Ap       SCS
       LAND USE            GROUP      (ACRES)   (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED               -          0.18      0.60      1.000      -
  USER-DEFINED               -          4.59      0.60      1.000      -
  USER-DEFINED               -          4.27      0.60      0.850      -
  USER-DEFINED               -          3.00      0.60      1.000      -
  USER-DEFINED               -          0.16      0.60      1.000      -
  USER-DEFINED               -          0.22      0.60      0.100      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.932
  SUBAREA AREA(ACRES) =  12.42      SUBAREA RUNOFF(CFS) =     0.50
  EFFECTIVE AREA(ACRES) =   105.49   AREA-AVERAGED Fm(INCH/HR) =  0.57
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =       105.5      PEAK FLOW RATE(CFS) =        6.34
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.83
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.604
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL     AREA       Fp         Ap       SCS
       LAND USE            GROUP      (ACRES)   (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED               -          2.55      0.60      1.000      -
  USER-DEFINED               -         10.49      0.60      1.000      -
  USER-DEFINED               -          2.87      0.60      0.850      -
  USER-DEFINED               -          3.70      0.60      1.000      -
  USER-DEFINED               -          3.12      0.60      1.000      -
  USER-DEFINED               -          0.54      0.60      1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.981
  SUBAREA AREA(ACRES) =  23.27      SUBAREA RUNOFF(CFS) =     0.33
  EFFECTIVE AREA(ACRES) =    128.76   AREA-AVERAGED Fm(INCH/HR) =  0.57
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =       128.8      PEAK FLOW RATE(CFS) =        6.34
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

*****************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.83
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.604
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL     AREA       Fp         Ap       SCS
       LAND USE            GROUP      (ACRES)   (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED               -          2.13      0.60      1.000      -
  USER-DEFINED               -          0.01      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) =   2.14      SUBAREA RUNOFF(CFS) =     0.01
  EFFECTIVE AREA(ACRES) =   130.90   AREA-AVERAGED Fm(INCH/HR) =  0.57
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =       130.9      PEAK FLOW RATE(CFS) =        6.34
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       130.9  TC(MIN.) =      26.83
  EFFECTIVE AREA(ACRES) =    130.90  AREA-AVERAGED Fm(INCH/HR)=  0.57
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 0.954
  PEAK FLOW RATE(CFS)   =        6.34
============================================================================
============================================================================
  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 *************************
 * RMV PA-4 WATERSHED 4 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 2-YR EV MARCH 2019 CCHIU                                           *
 *********************************************************************

  FILE NAME: X40402EV.DAT
  TIME/DATE OF STUDY: 08:50 03/26/2019
========================================================================
  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; 0.366
  10)   90.00; 0.300
  11)  120.00; 0.246
  12)  180.00; 0.190
  13)  360.00; 0.136
  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  60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40400.00 TO NODE  40401.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
  ELEVATION DATA: UPSTREAM(FEET) =    928.00  DOWNSTREAM(FEET) =    750.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   8.081
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.267
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp       Ap     SCS    Tc
     LAND USE              GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "CHAPARRAL,BROADLEAF"      -        0.75     0.60     1.000    0    8.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =       0.45
  TOTAL AREA(ACRES) =        0.75   PEAK FLOW RATE(CFS) =       0.45


*********************************************************************
  FLOW PROCESS FROM NODE  40401.00 TO NODE  40402.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    750.00  DOWNSTREAM(FEET) =    710.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   107.00   CHANNEL SLOPE = 0.3738
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.230
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp       Ap     SCS
     LAND USE              GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        1.17     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) =       0.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.12
  AVERAGE FLOW DEPTH(FEET) =  0.23    TRAVEL TIME(MIN.) =   0.35
  Tc(MIN.) =    8.43
  SUBAREA AREA(ACRES) =    1.17        SUBAREA RUNOFF(CFS) =    0.67
  EFFECTIVE AREA(ACRES) =      1.93       AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       1.09

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
      DEPTH(FEET) =  0.26    FLOW VELOCITY(FEET/SEC.) =   5.53
      LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40402.00 =     434.00 FEET.


  *****************************************************************************
    FLOW PROCESS FROM NODE  40402.00 TO NODE  40403.00 IS CODE =  51
  --------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    710.00  DOWNSTREAM(FEET) =     675.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE = 0.2756
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.186
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -         1.05      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) =       1.37
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.25
    AVERAGE FLOW DEPTH(FEET) =   0.29    TRAVEL TIME(MIN.) =   0.40
    Tc(MIN.) =    8.83
    SUBAREA AREA(ACRES) =    1.05      SUBAREA RUNOFF(CFS) =    0.55
    EFFECTIVE AREA(ACRES) =     2.97     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) =      1.57

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.31    FLOW VELOCITY(FEET/SEC.) =   5.45
    LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40403.00 =     561.00 FEET.


  *****************************************************************************
    FLOW PROCESS FROM NODE  40403.00 TO NODE  40404.00 IS CODE =  51
  --------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =     650.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   113.00   CHANNEL SLOPE = 0.2212
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.149
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -         1.95      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) =       2.05
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.40
    AVERAGE FLOW DEPTH(FEET) =   0.36    TRAVEL TIME(MIN.) =   0.35
    Tc(MIN.) =    9.18
    SUBAREA AREA(ACRES) =    1.95      SUBAREA RUNOFF(CFS) =    0.96
    EFFECTIVE AREA(ACRES) =     4.92     AREA-AVERAGED Fm(INCH/HR) =   0.60
    AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =       4.9        PEAK FLOW RATE(CFS) =      2.43
```

```
    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.38    FLOW VELOCITY(FEET/SEC.) =   5.65
    LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40404.00 =     674.00 FEET.

  *****************************************************************************
    FLOW PROCESS FROM NODE  40404.00 TO NODE  40405.00 IS CODE =  51
  --------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =     610.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE = 0.1826
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   2 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              -         2.15      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) =       2.89
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.40
    AVERAGE FLOW DEPTH(FEET) =   0.42    TRAVEL TIME(MIN.) =   0.68
    Tc(MIN.) =    9.86
    SUBAREA AREA(ACRES) =    2.15      SUBAREA RUNOFF(CFS) =    0.92
    EFFECTIVE AREA(ACRES) =     7.07     AREA-AVERAGED Fm(INCH/HR) =   0.60
    AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =       7.1        PEAK FLOW RATE(CFS) =      3.03

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.43    FLOW VELOCITY(FEET/SEC.) =   5.45
    LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40405.00 =     893.00 FEET.

  *****************************************************************************
    FLOW PROCESS FROM NODE  40405.00 TO NODE  40406.00 IS CODE =  51
  --------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =     605.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    43.00   CHANNEL SLOPE = 0.1163
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.060
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -         2.90      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) =       3.63
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.86
    AVERAGE FLOW DEPTH(FEET) =   0.50    TRAVEL TIME(MIN.) =   0.15
    Tc(MIN.) =   10.00
    SUBAREA AREA(ACRES) =    2.90      SUBAREA RUNOFF(CFS) =    1.20
    EFFECTIVE AREA(ACRES) =     9.97     AREA-AVERAGED Fm(INCH/HR) =   0.60
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  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      10.0        PEAK FLOW RATE(CFS) =      4.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   FLOW VELOCITY(FEET/SEC.) =  5.02
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40406.00 =   936.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40406.00 TO NODE  40407.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    602.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   52.00   CHANNEL SLOPE = 0.0577
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.050
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         4.51      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) =     5.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.06
  AVERAGE FLOW DEPTH(FEET) =   0.64   TRAVEL TIME(MIN.) =   0.21
  Tc(MIN.) =   10.22
  SUBAREA AREA(ACRES) =     4.51       SUBAREA RUNOFF(CFS) =    1.83
  EFFECTIVE AREA(ACRES) =      14.48      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      14.5        PEAK FLOW RATE(CFS) =      5.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.68   FLOW VELOCITY(FEET/SEC.) =  4.21
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40407.00 =   988.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40407.00 TO NODE  40408.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    602.00  DOWNSTREAM(FEET) =    559.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  533.00   CHANNEL SLOPE = 0.0807
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.971
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         5.99      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) =     6.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.93
  AVERAGE FLOW DEPTH(FEET) =   0.68   TRAVEL TIME(MIN.) =   1.80
  Tc(MIN.) =   12.02
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  SUBAREA AREA(ACRES) =     5.99       SUBAREA RUNOFF(CFS) =    2.00
  EFFECTIVE AREA(ACRES) =      20.47      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      20.5        PEAK FLOW RATE(CFS) =      6.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.68   FLOW VELOCITY(FEET/SEC.) =  4.99
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40408.00 =   1521.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40408.00 TO NODE  40409.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    559.00  DOWNSTREAM(FEET) =    509.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  702.00   CHANNEL SLOPE = 0.0712
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.865
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         6.05      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) =      7.56
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.84
  AVERAGE FLOW DEPTH(FEET) =   0.72   TRAVEL TIME(MIN.) =   2.42
  Tc(MIN.) =   14.44
  SUBAREA AREA(ACRES) =     6.05       SUBAREA RUNOFF(CFS) =    1.44
  EFFECTIVE AREA(ACRES) =      26.51      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      26.5        PEAK FLOW RATE(CFS) =      6.84
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.70   FLOW VELOCITY(FEET/SEC.) =  4.69
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40409.00 =   2223.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40409.00 TO NODE  40447.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    509.00  DOWNSTREAM(FEET) =    482.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  440.00   CHANNEL SLOPE = 0.0614
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.815
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         6.09      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) =      7.43
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   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.56
   AVERAGE FLOW DEPTH(FEET) =   0.74    TRAVEL TIME(MIN.) =   1.61
   Tc(MIN.) =   16.05
   SUBAREA AREA(ACRES) =       6.09       SUBAREA RUNOFF(CFS) =    1.18
   EFFECTIVE AREA(ACRES) =       32.60       AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        32.6       PEAK FLOW RATE(CFS) =        6.84
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.71   FLOW VELOCITY(FEET/SEC.) =   4.47
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =   2663.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 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.) =   16.05
   RAINFALL INTENSITY(INCH/HR) =   0.81
   AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60
   AREA-AVERAGED Ap =   1.00
   EFFECTIVE STREAM AREA(ACRES) =      32.60
   TOTAL STREAM AREA(ACRES) =      32.60
   PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.84

*****************************************************************************
   FLOW PROCESS FROM NODE  40410.00 TO NODE  40411.00 IS CODE =  21
------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
   ELEVATION DATA: UPSTREAM(FEET) =    878.00  DOWNSTREAM(FEET) =    726.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.371
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.236
   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
   "CHAPARRAL,BROADLEAF"      -        0.69      0.60      1.000      0     8.37
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   1.000
   SUBAREA RUNOFF(CFS) =      0.39
   TOTAL AREA(ACRES) =       0.69   PEAK FLOW RATE(CFS) =       0.39

*****************************************************************************
   FLOW PROCESS FROM NODE  40411.00 TO NODE  40412.00 IS CODE =  51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    726.00  DOWNSTREAM(FEET) =    687.00
```

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   CHANNEL LENGTH THRU SUBAREA(FEET) =   101.00   CHANNEL SLOPE = 0.3861
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.199
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp         Ap      SCS
       LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        0.91      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) =        0.64
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.88
   AVERAGE FLOW DEPTH(FEET) =   0.21    TRAVEL TIME(MIN.) =   0.35
   Tc(MIN.) =    8.72
   SUBAREA AREA(ACRES) =       0.91       SUBAREA RUNOFF(CFS) =    0.49
   EFFECTIVE AREA(ACRES) =        1.60       AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         1.6       PEAK FLOW RATE(CFS) =        0.86

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.23   FLOW VELOCITY(FEET/SEC.) =   5.34
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40412.00 =    430.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40412.00 TO NODE  40413.00 IS CODE =  51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    687.00  DOWNSTREAM(FEET) =    658.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   153.00   CHANNEL SLOPE = 0.1895
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.134
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp         Ap      SCS
       LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        0.96      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) =        1.09
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.24
   AVERAGE FLOW DEPTH(FEET) =   0.29    TRAVEL TIME(MIN.) =   0.60
   Tc(MIN.) =    9.32
   SUBAREA AREA(ACRES) =       0.96       SUBAREA RUNOFF(CFS) =    0.46
   EFFECTIVE AREA(ACRES) =        2.55       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) =        1.23

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.30   FLOW VELOCITY(FEET/SEC.) =   4.47
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40413.00 =    583.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40413.00 TO NODE  40414.00 IS CODE =  51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
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================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    658.00  DOWNSTREAM(FEET) =    615.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  247.00   CHANNEL SLOPE = 0.1741
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.051
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        2.51      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) =     1.74
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.63
   AVERAGE FLOW DEPTH(FEET) =   0.35    TRAVEL TIME(MIN.) =   0.89
   Tc(MIN.) =   10.21
   SUBAREA AREA(ACRES) =     2.51       SUBAREA RUNOFF(CFS) =    1.02
   EFFECTIVE AREA(ACRES) =      5.06     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         5.1       PEAK FLOW RATE(CFS) =       2.05

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.38    FLOW VELOCITY(FEET/SEC.) =   4.83
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40414.00 =    830.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  40414.00 TO NODE  40415.00 IS CODE = 51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    567.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  414.00   CHANNEL SLOPE = 0.1159
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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               -        4.38      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) =     2.81
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.53
   AVERAGE FLOW DEPTH(FEET) =   0.45    TRAVEL TIME(MIN.) =   1.52
   Tc(MIN.) =   11.73
   SUBAREA AREA(ACRES) =     4.38       SUBAREA RUNOFF(CFS) =    1.51
   EFFECTIVE AREA(ACRES) =      9.44     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         9.4       PEAK FLOW RATE(CFS) =       3.26

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.48    FLOW VELOCITY(FEET/SEC.) =   4.76
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40415.00 =   1244.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  40415.00 TO NODE  40416.00 IS CODE = 51
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   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    567.00  DOWNSTREAM(FEET) =    538.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  301.00   CHANNEL SLOPE = 0.0963
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.937
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        7.77      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) =     4.44
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.73
   AVERAGE FLOW DEPTH(FEET) =   0.56    TRAVEL TIME(MIN.) =   1.06
   Tc(MIN.) =   12.79
   SUBAREA AREA(ACRES) =     7.77       SUBAREA RUNOFF(CFS) =    2.36
   EFFECTIVE AREA(ACRES) =     17.21     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) =       5.22

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.59    FLOW VELOCITY(FEET/SEC.) =   4.96
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40416.00 =   1545.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  40416.00 TO NODE  40417.00 IS CODE = 51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    538.00  DOWNSTREAM(FEET) =    529.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  116.00   CHANNEL SLOPE = 0.0776
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.920
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -       16.20      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) =     7.56
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.05
   AVERAGE FLOW DEPTH(FEET) =   0.71    TRAVEL TIME(MIN.) =   0.38
   Tc(MIN.) =   13.17
   SUBAREA AREA(ACRES) =    16.20       SUBAREA RUNOFF(CFS) =    4.67
   EFFECTIVE AREA(ACRES) =     33.41     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        33.4       PEAK FLOW RATE(CFS) =       9.64

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.78    FLOW VELOCITY(FEET/SEC.) =   5.34
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40417.00 =   1661.00 FEET.

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    FLOW PROCESS FROM NODE  40417.00 TO NODE  40447.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    529.00  DOWNSTREAM(FEET) =    482.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   891.00   CHANNEL SLOPE = 0.0527
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.809
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA     Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        14.55     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) =     11.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.74
  AVERAGE FLOW DEPTH(FEET) =  0.88   TRAVEL TIME(MIN.) =  3.13
  Tc(MIN.) =   16.31
  SUBAREA AREA(ACRES) =   14.55       SUBAREA RUNOFF(CFS) =    2.73
  EFFECTIVE AREA(ACRES) =    47.96      AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       48.0        PEAK FLOW RATE(CFS) =      9.64
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.83   FLOW VELOCITY(FEET/SEC.) =  4.61
  LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40447.00 =   2552.00 FEET.

*******************************************************************************
    FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 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.) =   16.31
  RAINFALL INTENSITY(INCH/HR) =   0.81
  AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     47.96
  TOTAL STREAM AREA(ACRES) =     47.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.64

  ** CONFLUENCE DATA **
  STREAM      Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)         (ACRES)    NODE
    1       6.84   16.05    0.815   0.60( 0.60) 1.00     32.6   40400.00
    2       9.64   16.31    0.809   0.60( 0.60) 1.00     48.0   40410.00

  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      16.47   16.05    0.815   0.60( 0.60) 1.00     79.8   40400.00
    2      16.27   16.31    0.809   0.60( 0.60) 1.00     80.6   40410.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       16.47     Tc(MIN.) =    16.05
  EFFECTIVE AREA(ACRES) =        79.79  AREA-AVERAGED Fm(INCH/HR) = 0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =         80.6
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =   2663.00 FEET.

*******************************************************************************
    FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE =  10
------------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==============================================================================

*******************************************************************************
    FLOW PROCESS FROM NODE  40420.00 TO NODE  40421.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
  ELEVATION DATA: UPSTREAM(FEET) =    925.00  DOWNSTREAM(FEET) =    815.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.799
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.190
  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
  "CHAPARRAL,BROADLEAF"     -        0.31      0.60      1.000     0    8.80
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =        0.31   PEAK FLOW RATE(CFS) =      0.16

*******************************************************************************
    FLOW PROCESS FROM NODE  40421.00 TO NODE  40422.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    815.00  DOWNSTREAM(FEET) =    743.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   123.00   CHANNEL SLOPE = 0.5854
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.140
  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     -
  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) =      0.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.47
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 AVERAGE FLOW DEPTH(FEET) =   0.13    TRAVEL TIME(MIN.) =   0.46
 Tc(MIN.) =    9.26
 SUBAREA AREA(ACRES) =      0.30      SUBAREA RUNOFF(CFS) =    0.14
 EFFECTIVE AREA(ACRES) =       0.60      AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         0.6        PEAK FLOW RATE(CFS) =       0.29

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =  4.85
 LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40422.00 =    444.00 FEET.

************************************************************************
   FLOW PROCESS FROM NODE  40422.00 TO NODE  40423.00 IS CODE = 51
 ----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    665.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   142.00   CHANNEL SLOPE = 0.5493
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.092
 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      -
 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) =      0.47
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.26
 AVERAGE FLOW DEPTH(FEET) =   0.17    TRAVEL TIME(MIN.) =   0.45
 Tc(MIN.) =    9.71
 SUBAREA AREA(ACRES) =      0.80      SUBAREA RUNOFF(CFS) =    0.35
 EFFECTIVE AREA(ACRES) =       1.40      AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         1.4        PEAK FLOW RATE(CFS) =       0.62

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =  5.53
 LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40423.00 =    586.00 FEET.

************************************************************************
   FLOW PROCESS FROM NODE  40423.00 TO NODE  40424.00 IS CODE = 51
 ----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    665.00  DOWNSTREAM(FEET) =    630.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    99.00   CHANNEL SLOPE = 0.3535
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   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             -          0.32       0.60      1.000      -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
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 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        0.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.89
 AVERAGE FLOW DEPTH(FEET) =   0.22    TRAVEL TIME(MIN.) =   0.34
 Tc(MIN.) =   10.04
 SUBAREA AREA(ACRES) =      0.32      SUBAREA RUNOFF(CFS) =    0.13
 EFFECTIVE AREA(ACRES) =       1.72      AREA-AVERAGED Fm(INCH/HR) =  0.60
 AREA-AVERAGED Fp(INCH/HR) =  0.60 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         1.7        PEAK FLOW RATE(CFS) =       0.71

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =  4.97
 LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40424.00 =    685.00 FEET.

************************************************************************
   FLOW PROCESS FROM NODE  40424.00 TO NODE  40425.00 IS CODE = 51
 ----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    615.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    35.00   CHANNEL SLOPE = 0.4286
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.054
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp         Ap      SCS
      LAND USE           GROUP      (ACRES)   (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -          1.87       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) =        1.09
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.88
 AVERAGE FLOW DEPTH(FEET) =   0.25    TRAVEL TIME(MIN.) =   0.10
 Tc(MIN.) =   10.14
 SUBAREA AREA(ACRES) =      1.87      SUBAREA RUNOFF(CFS) =    0.76
 EFFECTIVE AREA(ACRES) =       3.59      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) =       1.47

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =  6.35
 LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40425.00 =    720.00 FEET.

************************************************************************
   FLOW PROCESS FROM NODE  40425.00 TO NODE  40426.00 IS CODE = 51
 ----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    574.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   260.00   CHANNEL SLOPE = 0.1577
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.011
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp         Ap      SCS
      LAND USE           GROUP      (ACRES)   (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -          1.19       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) =      1.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.49
  AVERAGE FLOW DEPTH(FEET) =   0.35    TRAVEL TIME(MIN.) =   0.96
  Tc(MIN.) =   11.11
  SUBAREA AREA(ACRES) =      1.19      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      4.78     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =       1.77

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36    FLOW VELOCITY(FEET/SEC.) =  4.52
  LONGEST FLOWPATH FROM NODE 40420.00 TO NODE 40426.00 =   980.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40426.00 TO NODE  40427.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   574.00  DOWNSTREAM(FEET) =    533.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  322.00   CHANNEL SLOPE = 0.1273
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.956
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
         LAND USE           GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -        1.82      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) =      2.06
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.31
  AVERAGE FLOW DEPTH(FEET) =   0.40    TRAVEL TIME(MIN.) =   1.25
  Tc(MIN.) =   12.36
  SUBAREA AREA(ACRES) =      1.82      SUBAREA RUNOFF(CFS) =    0.58
  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) =       2.12

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40    FLOW VELOCITY(FEET/SEC.) =  4.38
  LONGEST FLOWPATH FROM NODE 40420.00 TO NODE 40427.00 =   1302.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40427.00 TO NODE  40428.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   533.00  DOWNSTREAM(FEET) =    521.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  160.00   CHANNEL SLOPE = 0.0750
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.927
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
```

```
           LAND USE           GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -        6.79      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) =      3.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.93
  AVERAGE FLOW DEPTH(FEET) =   0.51    TRAVEL TIME(MIN.) =   0.68
  Tc(MIN.) =   13.03
  SUBAREA AREA(ACRES) =      6.79      SUBAREA RUNOFF(CFS) =    2.00
  EFFECTIVE AREA(ACRES) =      13.39     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) =       3.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.56    FLOW VELOCITY(FEET/SEC.) =  4.19
  LONGEST FLOWPATH FROM NODE 40420.00 TO NODE 40428.00 =   1462.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40428.00 TO NODE  40429.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   521.00  DOWNSTREAM(FEET) =    508.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  221.00   CHANNEL SLOPE = 0.0588
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.885
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
         LAND USE           GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -        3.74      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) =      4.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.92
  AVERAGE FLOW DEPTH(FEET) =   0.61    TRAVEL TIME(MIN.) =   0.94
  Tc(MIN.) =   13.97
  SUBAREA AREA(ACRES) =      3.74      SUBAREA RUNOFF(CFS) =    0.96
  EFFECTIVE AREA(ACRES) =      17.13     AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        17.1       PEAK FLOW RATE(CFS) =       4.40

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.61    FLOW VELOCITY(FEET/SEC.) =  3.97
  LONGEST FLOWPATH FROM NODE 40420.00 TO NODE 40429.00 =   1683.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40429.00 TO NODE  40446.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   508.00  DOWNSTREAM(FEET) =    489.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  306.00   CHANNEL SLOPE = 0.0621
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.835
```

```
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap      SCS
    LAND USE             GROUP     (ACRES)   (INCH/HR) (DECIMAL)   CN
 USER-DEFINED              -         0.99       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) =       4.50
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.07
 AVERAGE FLOW DEPTH(FEET) =  0.61   TRAVEL TIME(MIN.) =   1.25
 Tc(MIN.) =   15.23
 SUBAREA AREA(ACRES) =      0.99      SUBAREA RUNOFF(CFS) =    0.21
 EFFECTIVE AREA(ACRES) =     18.12    AREA-AVERAGED Fm(INCH/HR) =   0.60
 AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      18.1        PEAK FLOW RATE(CFS) =       4.40
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =   4.00
 LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =   1989.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE =  10
 -------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
 =========================================================================

***************************************************************************
  FLOW PROCESS FROM NODE  40430.00 TO NODE  40431.00 IS CODE =  21
 -------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   302.00
  ELEVATION DATA: UPSTREAM(FEET) =   1035.00  DOWNSTREAM(FEET) =    875.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.870
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.290
  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
  "CHAPARRAL,BROADLEAF"     -        0.40       0.60      1.000     0     7.87
  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) =       0.40   PEAK FLOW RATE(CFS) =       0.25

***************************************************************************
  FLOW PROCESS FROM NODE  40431.00 TO NODE  40432.00 IS CODE =  51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    875.00  DOWNSTREAM(FEET) =    800.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE = 0.4688
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.231
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap     SCS
     LAND USE             GROUP     (ACRES)   (INCH/HR) (DECIMAL)   CN
  USER-DEFINED              -        0.65       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) =       0.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.86
  AVERAGE FLOW DEPTH(FEET) =  0.17   TRAVEL TIME(MIN.) =   0.55
  Tc(MIN.) =    8.42
  SUBAREA AREA(ACRES) =      0.65      SUBAREA RUNOFF(CFS) =    0.37
  EFFECTIVE AREA(ACRES) =      1.05    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) =       0.60

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   5.21
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40432.00 =    462.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40432.00 TO NODE  40433.00 IS CODE =  51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    712.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE = 0.5867
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap     SCS
     LAND USE             GROUP     (ACRES)   (INCH/HR) (DECIMAL)   CN
  USER-DEFINED              -        1.08       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) =       0.88
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.29
  AVERAGE FLOW DEPTH(FEET) =  0.22   TRAVEL TIME(MIN.) =   0.40
  Tc(MIN.) =    8.82
  SUBAREA AREA(ACRES) =      1.08      SUBAREA RUNOFF(CFS) =    0.57
  EFFECTIVE AREA(ACRES) =      2.13    AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       2.1        PEAK FLOW RATE(CFS) =       1.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =   6.57
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40433.00 =    612.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40433.00 TO NODE  40434.00 IS CODE =  51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    712.00  DOWNSTREAM(FEET) =    657.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   120.00   CHANNEL SLOPE = 0.4583
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   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.155
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        1.98       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) =      1.62
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.66
   AVERAGE FLOW DEPTH(FEET) =  0.29   TRAVEL TIME(MIN.) =   0.30
   Tc(MIN.) =    9.12
   SUBAREA AREA(ACRES) =     1.98       SUBAREA RUNOFF(CFS) =    0.99
   EFFECTIVE AREA(ACRES) =      4.11      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       4.1          PEAK FLOW RATE(CFS) =      2.06

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.31   FLOW VELOCITY(FEET/SEC.) =  7.14
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40434.00 =    732.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  40434.00 TO NODE  40435.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    657.00  DOWNSTREAM(FEET) =     620.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   161.00   CHANNEL SLOPE = 0.2298
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.105
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        2.34       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) =      2.59
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.79
   AVERAGE FLOW DEPTH(FEET) =  0.39   TRAVEL TIME(MIN.) =   0.46
   Tc(MIN.) =    9.58
   SUBAREA AREA(ACRES) =     2.34       SUBAREA RUNOFF(CFS) =    1.06
   EFFECTIVE AREA(ACRES) =      6.46      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) =      2.94

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.41   FLOW VELOCITY(FEET/SEC.) =  5.90
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40435.00 =    893.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  40435.00 TO NODE  40445.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =     579.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   358.00   CHANNEL SLOPE = 0.1145
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.022
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        1.75       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) =      3.27
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.66
   AVERAGE FLOW DEPTH(FEET) =  0.48   TRAVEL TIME(MIN.) =   1.28
   Tc(MIN.) =   10.86
   SUBAREA AREA(ACRES) =     1.75       SUBAREA RUNOFF(CFS) =    0.67
   EFFECTIVE AREA(ACRES) =      8.21      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       8.2          PEAK FLOW RATE(CFS) =      3.12

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.48   FLOW VELOCITY(FEET/SEC.) =  4.59
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40445.00 =   1251.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  40445.00 TO NODE  40445.00 IS CODE =  1
------------------------------------------------------------------------------
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
   TOTAL NUMBER OF STREAMS = 2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
   TIME OF CONCENTRATION(MIN.) =  10.86
   RAINFALL INTENSITY(INCH/HR) =  1.02
   AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =      8.21
   TOTAL STREAM AREA(ACRES) =       8.21
   PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.12

******************************************************************************
   FLOW PROCESS FROM NODE  40440.00 TO NODE  40441.00 IS CODE = 21
------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   319.00
   ELEVATION DATA: UPSTREAM(FEET) =   1020.00  DOWNSTREAM(FEET) =     898.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.213
   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
   "CHAPARRAL,BROADLEAF"     -        0.75       0.60      1.000    0   8.59
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
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    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
    SUBAREA RUNOFF(CFS) =     0.41
    TOTAL AREA(ACRES) =       0.75   PEAK FLOW RATE(CFS) =       0.41


*************************************************************************
    FLOW PROCESS FROM NODE  40441.00 TO NODE  40442.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    898.00  DOWNSTREAM(FEET) =    760.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  253.00   CHANNEL SLOPE = 0.5455
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.131
    SUBAREA LOSS RATE DATA(AMC II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
          LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
     USER-DEFINED             -         0.89     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) =      0.63
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.58
    AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   0.76
    Tc(MIN.) =    9.34
    SUBAREA AREA(ACRES) =      0.89      SUBAREA RUNOFF(CFS) =    0.42
    EFFECTIVE AREA(ACRES) =    1.64      AREA-AVERAGED Fm(INCH/HR) =   0.60
    AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =        1.6          PEAK FLOW RATE(CFS) =       0.78

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.21   FLOW VELOCITY(FEET/SEC.) =   5.88
    LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40442.00 =    572.00 FEET.

*************************************************************************
    FLOW PROCESS FROM NODE  40442.00 TO NODE  40443.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    760.00  DOWNSTREAM(FEET) =    653.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  188.00   CHANNEL SLOPE = 0.5691
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.081
    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) =      1.17
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.71
    AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   0.47
    Tc(MIN.) =    9.81
    SUBAREA AREA(ACRES) =      1.80      SUBAREA RUNOFF(CFS) =    0.78
    EFFECTIVE AREA(ACRES) =    3.44      AREA-AVERAGED Fm(INCH/HR) =   0.60
    AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
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    TOTAL AREA(ACRES) =        3.4          PEAK FLOW RATE(CFS) =       1.49

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.26   FLOW VELOCITY(FEET/SEC.) =   7.11
    LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40443.00 =    760.00 FEET.

*************************************************************************
    FLOW PROCESS FROM NODE  40443.00 TO NODE  40444.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    653.00  DOWNSTREAM(FEET) =    605.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  198.00   CHANNEL SLOPE = 0.2424
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.042
    SUBAREA LOSS RATE DATA(AMC II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
          LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
     USER-DEFINED             -         3.16     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) =      2.12
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.58
    AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   0.59
    Tc(MIN.) =   10.40
    SUBAREA AREA(ACRES) =      3.16      SUBAREA RUNOFF(CFS) =    1.26
    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) =       2.63

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.39   FLOW VELOCITY(FEET/SEC.) =   5.87
    LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40444.00 =    958.00 FEET.

*************************************************************************
    FLOW PROCESS FROM NODE  40444.00 TO NODE  40445.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    579.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  243.00   CHANNEL SLOPE = 0.1070
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   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             -         1.67     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) =      2.93
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.46
    AVERAGE FLOW DEPTH(FEET) =   0.47   TRAVEL TIME(MIN.) =   0.91
    Tc(MIN.) =   11.31
    SUBAREA AREA(ACRES) =      1.67      SUBAREA RUNOFF(CFS) =    0.61
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   EFFECTIVE AREA(ACRES) =     8.27     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         8.3      PEAK FLOW RATE(CFS) =        3.00

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.47   FLOW VELOCITY(FEET/SEC.) =   4.52
   LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40445.00 =   1201.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40445.00 TO NODE  40445.00 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) =   1.00
   AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =        8.27
   TOTAL STREAM AREA(ACRES) =       8.27
   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       3.12   10.86   1.022   0.60( 0.60) 1.00      8.2    40430.00
     2       3.00   11.31   1.002   0.60( 0.60) 1.00      8.3    40440.00

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

   ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)    NODE
     1       6.12   10.86   1.022   0.60( 0.60) 1.00     16.2    40430.00
     2       5.97   11.31   1.002   0.60( 0.60) 1.00     16.5    40440.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =        6.12    Tc(MIN.) =    10.86
   EFFECTIVE AREA(ACRES) =      16.16   AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        16.5
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40445.00 =   1251.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40445.00 TO NODE  40446.00 IS CODE = 51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    579.00  DOWNSTREAM(FEET) =     489.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  636.00   CHANNEL SLOPE = 0.1415
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.946
```

```
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -       3.79    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) =      6.71
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.10
   AVERAGE FLOW DEPTH(FEET) =  0.61    TRAVEL TIME(MIN.) =  1.74
   Tc(MIN.) =  12.60
   SUBAREA AREA(ACRES) =      3.79      SUBAREA RUNOFF(CFS) =   1.18
   EFFECTIVE AREA(ACRES) =      19.94    AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        20.3       PEAK FLOW RATE(CFS) =      6.21

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.59   FLOW VELOCITY(FEET/SEC.) =   5.94
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40446.00 =   1887.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE = 11
--------------------------------------------------------------------------------
   >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================
   ** MAIN STREAM CONFLUENCE DATA **
   STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)    NODE
     1       6.21   12.60   0.946   0.60( 0.60) 1.00     19.9    40430.00
     2       5.97   13.06   0.925   0.60( 0.60) 1.00     20.3    40440.00
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40446.00 =   1887.00 FEET.

   ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)    NODE
     1       4.40   15.23   0.835   0.60( 0.60) 1.00     18.1    40420.00
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =   1989.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)    NODE
     1      10.60   12.60   0.946   0.60( 0.60) 1.00     34.9    40430.00
     2      10.37   13.06   0.925   0.60( 0.60) 1.00     35.8    40440.00
     3       8.71   15.23   0.835   0.60( 0.60) 1.00     38.4    40420.00
    TOTAL AREA(ACRES) =        38.4

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =       10.60  Tc(MIN.) =   12.599
   EFFECTIVE AREA(ACRES) =      34.93   AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        38.4
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =   1989.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE = 12
--------------------------------------------------------------------------------
   >>>>>CLEAR MEMORY BANK # 2 <<<<<
================================================================================
```

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*********************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40447.00 IS CODE =  51
-------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    489.00  DOWNSTREAM(FEET) =    482.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   167.00   CHANNEL SLOPE = 0.0419
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.918
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         0.59      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) =      10.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.35
  AVERAGE FLOW DEPTH(FEET) =   0.91   TRAVEL TIME(MIN.) =   0.64
  Tc(MIN.) =   13.24
  SUBAREA AREA(ACRES) =      0.59      SUBAREA RUNOFF(CFS) =    0.17
  EFFECTIVE AREA(ACRES) =     35.52      AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       39.0         PEAK FLOW RATE(CFS) =     10.60
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.90   FLOW VELOCITY(FEET/SEC.) =   4.33
  LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40447.00 =    2156.00 FEET.

*********************************************************************
  FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE =  11
-------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
===================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)         (ACRES)    NODE
     1      10.60  13.24   0.918    0.60( 0.60) 1.00     35.5   40430.00
     2      10.37  13.71   0.897    0.60( 0.60) 1.00     36.4   40440.00
     3       8.71  15.90   0.818    0.60( 0.60) 1.00     39.0   40420.00
  LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40447.00 =    2156.00 FEET.

  ** MEMORY BANK # 1 CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)         (ACRES)    NODE
     1      16.47  16.05   0.815    0.60( 0.60) 1.00     79.8   40400.00
     2      16.27  16.31   0.809    0.60( 0.60) 1.00     80.6   40410.00
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)         (ACRES)    NODE
     1      27.08  13.24   0.918    0.60( 0.60) 1.00    101.3   40430.00
     2      26.84  13.71   0.897    0.60( 0.60) 1.00    104.6   40440.00
```

```
     3      25.18  15.90   0.818    0.60( 0.60) 1.00    118.1   40420.00
     4      25.04  16.05   0.815    0.60( 0.60) 1.00    118.8   40400.00
     5      24.59  16.31   0.809    0.60( 0.60) 1.00    119.5   40410.00
  TOTAL AREA(ACRES) =       119.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        27.08   Tc(MIN.) =   13.239
  EFFECTIVE AREA(ACRES) =     101.34   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60   AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       119.5
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

*********************************************************************
  FLOW PROCESS FROM NODE  40447.00 TO NODE  40448.00 IS CODE =  12
-------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
===================================================================

*********************************************************************
  FLOW PROCESS FROM NODE  40447.00 TO NODE  40448.00 IS CODE =  51
-------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    482.00  DOWNSTREAM(FEET) =    447.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   926.00   CHANNEL SLOPE = 0.0378
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.813
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        24.32      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) =      29.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.35
  AVERAGE FLOW DEPTH(FEET) =   1.35   TRAVEL TIME(MIN.) =   2.88
  Tc(MIN.) =   16.12
  SUBAREA AREA(ACRES) =     24.32      SUBAREA RUNOFF(CFS) =    4.67
  EFFECTIVE AREA(ACRES) =    125.66      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       143.9         PEAK FLOW RATE(CFS) =     27.08
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.31   FLOW VELOCITY(FEET/SEC.) =   5.26
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40448.00 =    3589.00 FEET.

*********************************************************************
  FLOW PROCESS FROM NODE  40448.00 TO NODE  40449.00 IS CODE =  51
-------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =    433.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   443.00   CHANNEL SLOPE = 0.0316
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
```

```
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.779
    SUBAREA LOSS RATE DATA(AMC II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED               -       108.49     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) =      35.88
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.27
    AVERAGE FLOW DEPTH(FEET) =  1.51   TRAVEL TIME(MIN.) =  1.40
    Tc(MIN.) =  17.52
    SUBAREA AREA(ACRES) =  108.49      SUBAREA RUNOFF(CFS) =  17.54
    EFFECTIVE AREA(ACRES) =   234.15     AREA-AVERAGED Fm(INCH/HR) =  0.60
    AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =    252.3       PEAK FLOW RATE(CFS) =     37.86

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.54   FLOW VELOCITY(FEET/SEC.) =  5.35
    LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40449.00 =   4032.00 FEET.


*******************************************************************************
  FLOW PROCESS FROM NODE  40449.00 TO NODE  40450.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    433.00  DOWNSTREAM(FEET) =    398.00
    CHANNEL LENGTH THRU SUBAREA(FEET) = 1065.00   CHANNEL SLOPE = 0.0329
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   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               -        36.85     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) =      39.63
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.49
    AVERAGE FLOW DEPTH(FEET) =  1.55   TRAVEL TIME(MIN.) =  3.24
    Tc(MIN.) =  20.76
    SUBAREA AREA(ACRES) =   36.85      SUBAREA RUNOFF(CFS) =  3.53
    EFFECTIVE AREA(ACRES) =   271.00     AREA-AVERAGED Fm(INCH/HR) =  0.60
    AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =    289.2       PEAK FLOW RATE(CFS) =     37.86
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.52   FLOW VELOCITY(FEET/SEC.) =  5.44
    LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40450.00 =   5097.00 FEET.


*******************************************************************************
  FLOW PROCESS FROM NODE  40450.00 TO NODE  40451.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
```
```
    ELEVATION DATA: UPSTREAM(FEET) =    398.00  DOWNSTREAM(FEET) =    386.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  401.00   CHANNEL SLOPE = 0.0299
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.684
    SUBAREA LOSS RATE DATA(AMC II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED               -        71.80     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) =      40.58
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.34
    AVERAGE FLOW DEPTH(FEET) =  1.59   TRAVEL TIME(MIN.) =  1.25
    Tc(MIN.) =  22.01
    SUBAREA AREA(ACRES) =   71.80      SUBAREA RUNOFF(CFS) =  5.43
    EFFECTIVE AREA(ACRES) =   342.80     AREA-AVERAGED Fm(INCH/HR) =  0.60
    AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =    361.0       PEAK FLOW RATE(CFS) =     37.86
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.55   FLOW VELOCITY(FEET/SEC.) =  5.24
    LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40451.00 =   5498.00 FEET.


********************************************************************************
  FLOW PROCESS FROM NODE  40451.00 TO NODE  40452.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    386.00  DOWNSTREAM(FEET) =    358.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  957.00   CHANNEL SLOPE = 0.0293
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.639
    SUBAREA LOSS RATE DATA(AMC II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED               -        12.07     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) =      38.07
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.47
    AVERAGE FLOW DEPTH(FEET) =  1.40   TRAVEL TIME(MIN.) =  2.47
    Tc(MIN.) =  24.47
    SUBAREA AREA(ACRES) =   12.07      SUBAREA RUNOFF(CFS) =  0.43
    EFFECTIVE AREA(ACRES) =   354.87     AREA-AVERAGED Fm(INCH/HR) =  0.60
    AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =    373.1       PEAK FLOW RATE(CFS) =     37.86
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.40   FLOW VELOCITY(FEET/SEC.) =  6.45
    LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40452.00 =   6455.00 FEET.


********************************************************************************
  FLOW PROCESS FROM NODE  40452.00 TO NODE  40453.00 IS CODE = 51
```

```
    ------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
    ======================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =    341.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  429.00   CHANNEL SLOPE = 0.0396
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
    *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.624
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -        0.27     0.60     0.500     -
    USER-DEFINED              -        1.96     0.60     1.000     -
    USER-DEFINED              -        0.96     0.60     1.000     -
    USER-DEFINED              -        0.38     0.60     1.000     -
    USER-DEFINED              -        0.18     0.60     1.000     -
    USER-DEFINED              -        1.69     0.60     1.000     -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.975
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      37.95
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.23
    AVERAGE FLOW DEPTH(FEET) =  1.32    TRAVEL TIME(MIN.) =   0.99
    Tc(MIN.) =   25.46
    SUBAREA AREA(ACRES) =    5.44       SUBAREA RUNOFF(CFS) =    0.19
    EFFECTIVE AREA(ACRES) =    360.31     AREA-AVERAGED Fm(INCH/HR) =   0.60
    AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =     378.5       PEAK FLOW RATE(CFS) =     37.86
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 1.32    FLOW VELOCITY(FEET/SEC.) =  7.21
    LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40453.00 =   6884.00 FEET.

    **************************************************************************
    FLOW PROCESS FROM NODE  40453.00 TO NODE  40453.00 IS CODE = 81
    ------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
    ======================================================================
    MAINLINE Tc(MIN.) =   25.46
    *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.624
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -        0.18     0.60     1.000     -
    USER-DEFINED              -        5.30     0.60     0.850     -
    USER-DEFINED              -        0.64     0.60     1.000     -
    USER-DEFINED              -        2.08     0.60     1.000     -
    USER-DEFINED              -        0.67     0.60     0.100     -
    USER-DEFINED              -        0.29     0.60     1.000     -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.847
    SUBAREA AREA(ACRES) =    9.16       SUBAREA RUNOFF(CFS) =    0.95
    EFFECTIVE AREA(ACRES) =    369.47     AREA-AVERAGED Fm(INCH/HR) =   0.60
    AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =     387.7       PEAK FLOW RATE(CFS) =     37.86
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
    **************************************************************************
    FLOW PROCESS FROM NODE  40453.00 TO NODE  40450.00 IS CODE = 81
    ------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
    ======================================================================
    MAINLINE Tc(MIN.) =   25.46
    *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.624
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -        0.03     0.60     1.000     -
    USER-DEFINED              -        4.59     0.60     0.850     -
    USER-DEFINED              -        0.01     0.60     1.000     -
    USER-DEFINED              -        0.51     0.60     1.000     -
    USER-DEFINED              -        0.73     0.60     1.000     -
    USER-DEFINED              -        0.16     0.60     1.000     -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.886
    SUBAREA AREA(ACRES) =    6.03       SUBAREA RUNOFF(CFS) =    0.50
    EFFECTIVE AREA(ACRES) =    375.50    AREA-AVERAGED Fm(INCH/HR) =   0.60
    AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  0.99
    TOTAL AREA(ACRES) =     393.7       PEAK FLOW RATE(CFS) =     37.86
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

    **************************************************************************
    FLOW PROCESS FROM NODE  40453.00 TO NODE  40453.00 IS CODE = 81
    ------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
    ======================================================================
    MAINLINE Tc(MIN.) =   25.46
    *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.624
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -        0.37     0.60     1.000     -
    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) =    0.87       SUBAREA RUNOFF(CFS) =    0.02
    EFFECTIVE AREA(ACRES) =    376.37    AREA-AVERAGED Fm(INCH/HR) =   0.60
    AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =  0.99
    TOTAL AREA(ACRES) =     394.6       PEAK FLOW RATE(CFS) =     37.86
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
    ======================================================================
    END OF STUDY SUMMARY:
    TOTAL AREA(ACRES)    =     394.6   TC(MIN.) =    25.46
    EFFECTIVE AREA(ACRES) =   376.37  AREA-AVERAGED Fm(INCH/HR)=  0.60
    AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 0.994
    PEAK FLOW RATE(CFS)   =      37.86

    ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity  Fp(Fm)     Ap     Ae    HEADWATER
    NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
      1      37.86  25.46   0.624   0.60( 0.60) 0.99   376.4  40430.00
      2      35.93  26.07   0.615   0.60( 0.60) 0.99   379.6  40440.00
      3      25.86  29.07   0.573   0.60( 0.60) 0.99   393.1  40420.00
      4      25.37  29.28   0.570   0.60( 0.60) 0.99   393.8  40400.00
```

```
     5      24.59   29.60    0.566  0.60( 0.60) 0.99     394.6   40410.00
================================================================================
================================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
********************************************************************************
                RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
                (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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                  Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                          Analysis prepared by:

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                          Santa Ana, CA92707


  ************************** DESCRIPTION OF STUDY *************************
 * RMV PA-4 WATERSHED 5 EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 2-YR EV MARCH 2019 CCHIU                                              *
  *********************************************************************

  FILE NAME: X40502EV.DAT
  TIME/DATE OF STUDY: 08:57 03/26/2019
================================================================================
  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; 0.366
  10)   90.00; 0.300
  11)  120.00; 0.246
  12)  180.00; 0.190
  13)  360.00; 0.136
  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  60.0    30.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40500.00 TO NODE  40501.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   328.00
  ELEVATION DATA: UPSTREAM(FEET) =    961.00  DOWNSTREAM(FEET) =   845.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.819
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.188
  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
  "CHAPARRAL,BROADLEAF"     -       0.63     0.60      1.000     0    8.82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.33
  TOTAL AREA(ACRES) =       0.63   PEAK FLOW RATE(CFS) =       0.33


********************************************************************************
  FLOW PROCESS FROM NODE  40501.00 TO NODE  40502.00 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    845.00  DOWNSTREAM(FEET) =    788.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   141.00    CHANNEL SLOPE = 0.4043
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.136
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED              -       1.11     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) =        0.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.96
  AVERAGE FLOW DEPTH(FEET) =   0.20    TRAVEL TIME(MIN.) =   0.47
  Tc(MIN.) =    9.29
  SUBAREA AREA(ACRES) =    1.11       SUBAREA RUNOFF(CFS) =    0.54
  EFFECTIVE AREA(ACRES) =      1.74      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.7          PEAK FLOW RATE(CFS) =       0.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   5.48
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40502.00 =    469.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  40502.00 TO NODE  40503.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    788.00  DOWNSTREAM(FEET) =    719.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  187.00   CHANNEL SLOPE =  0.3690
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 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              -        1.44      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) =       1.15
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.57
   AVERAGE FLOW DEPTH(FEET) =  0.26   TRAVEL TIME(MIN.) =  0.56
   Tc(MIN.) =   9.85
   SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    0.62
   EFFECTIVE AREA(ACRES) =     3.18    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) =      1.36

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =   5.82
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40503.00 =    656.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  40503.00 TO NODE  40504.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    719.00  DOWNSTREAM(FEET) =    545.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  302.00   CHANNEL SLOPE =  0.5762
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.038
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        3.36      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.) =  7.77
   AVERAGE FLOW DEPTH(FEET) =  0.29   TRAVEL TIME(MIN.) =  0.65
   Tc(MIN.) =  10.50
   SUBAREA AREA(ACRES) =    3.36      SUBAREA RUNOFF(CFS) =    1.32
   EFFECTIVE AREA(ACRES) =     6.54    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) =      2.58
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   8.13
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40504.00 =    958.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40504.00 TO NODE  40505.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    470.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  328.00   CHANNEL SLOPE =  0.2287
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.001
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        9.58      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) =       4.31
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.50
   AVERAGE FLOW DEPTH(FEET) =  0.47   TRAVEL TIME(MIN.) =  0.84
   Tc(MIN.) =  11.34
   SUBAREA AREA(ACRES) =    9.58      SUBAREA RUNOFF(CFS) =    3.46
   EFFECTIVE AREA(ACRES) =    16.12    AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      16.1         PEAK FLOW RATE(CFS) =      5.82

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =   7.08
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40505.00 =   1286.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40505.00 TO NODE  40506.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  507.00   CHANNEL SLOPE =  0.1183
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.937
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -       10.98      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) =       7.49
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.85
   AVERAGE FLOW DEPTH(FEET) =  0.65   TRAVEL TIME(MIN.) =  1.44
   Tc(MIN.) =  12.79
   SUBAREA AREA(ACRES) =   10.98      SUBAREA RUNOFF(CFS) =    3.34
   EFFECTIVE AREA(ACRES) =    27.10    AREA-AVERAGED Fm(INCH/HR) =   0.60
```

AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) =   27.1   PEAK FLOW RATE(CFS) =   8.23

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.68   FLOW VELOCITY(FEET/SEC.) =   6.00
LONGEST FLOWPATH FROM NODE 40500.00 TO NODE 40506.00 =   1793.00 FEET.

****
  FLOW PROCESS FROM NODE 40506.00 TO NODE 40507.00 IS CODE = 51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===
  ELEVATION DATA: UPSTREAM(FEET) =   410.00 DOWNSTREAM(FEET) =   355.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   698.00 CHANNEL SLOPE = 0.0788
  CHANNEL BASE(FEET) =   0.00 "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040 MAXIMUM DEPTH(FEET) = 20.00
  * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.840
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
        LAND USE   GROUP   (ACRES) (INCH/HR) (DECIMAL)   CN
  USER-DEFINED   -   4.53   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) =   8.72
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.24
  AVERAGE FLOW DEPTH(FEET) =   0.74   TRAVEL TIME(MIN.) =   2.22
  Tc(MIN.) = 15.01
  SUBAREA AREA(ACRES) =   4.53   SUBAREA RUNOFF(CFS) =   0.98
  EFFECTIVE AREA(ACRES) =   31.63   AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =   31.6   PEAK FLOW RATE(CFS) =   8.23
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.73   FLOW VELOCITY(FEET/SEC.) =   5.16
  LONGEST FLOWPATH FROM NODE 40500.00 TO NODE 40507.00 =   2491.00 FEET.

****
  FLOW PROCESS FROM NODE 40507.00 TO NODE 40518.00 IS CODE = 51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===
  ELEVATION DATA: UPSTREAM(FEET) =   355.00 DOWNSTREAM(FEET) =   341.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   604.00 CHANNEL SLOPE = 0.0232
  CHANNEL BASE(FEET) =   0.00 "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 20.00
  * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.781
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
        LAND USE   GROUP   (ACRES) (INCH/HR) (DECIMAL)   CN
  USER-DEFINED   -   9.02   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) =   8.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.12
  AVERAGE FLOW DEPTH(FEET) =   0.85   TRAVEL TIME(MIN.) =   2.44

Tc(MIN.) =   17.45
SUBAREA AREA(ACRES) =   9.02   SUBAREA RUNOFF(CFS) =   1.47
EFFECTIVE AREA(ACRES) =   40.66   AREA-AVERAGED Fm(INCH/HR) =   0.60
AREA-AVERAGED Fp(INCH/HR) = 0.60 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) =   40.7   PEAK FLOW RATE(CFS) =   8.23
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.83   FLOW VELOCITY(FEET/SEC.) =   4.01
LONGEST FLOWPATH FROM NODE 40500.00 TO NODE 40518.00 =   3095.00 FEET.

****
  FLOW PROCESS FROM NODE 40518.00 TO NODE 40518.00 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.) =   17.45
  RAINFALL INTENSITY(INCH/HR) =   0.78
  AREA-AVERAGED Fm(INCH/HR) = 0.60
  AREA-AVERAGED Fp(INCH/HR) = 0.60
  AREA-AVERAGED Ap = 1.00
  EFFECTIVE STREAM AREA(ACRES) =   40.66
  TOTAL STREAM AREA(ACRES) =   40.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =   8.23

****
  FLOW PROCESS FROM NODE 40510.00 TO NODE 40511.00 IS CODE = 21

  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
  ELEVATION DATA: UPSTREAM(FEET) =   851.00 DOWNSTREAM(FEET) =   735.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   8.835
  * 2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.186
  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
  "CHAPARRAL,BROADLEAF"   -   0.48   0.60   1.000   0   8.84
  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) =   0.48   PEAK FLOW RATE(CFS) =   0.25

****
  FLOW PROCESS FROM NODE 40511.00 TO NODE 40512.00 IS CODE = 51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===
  ELEVATION DATA: UPSTREAM(FEET) =   735.00 DOWNSTREAM(FEET) =   650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   116.00 CHANNEL SLOPE = 0.7328
  CHANNEL BASE(FEET) =   0.00 "Z" FACTOR =   3.000

```
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
    *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.150
    SUBAREA LOSS RATE DATA(AMC II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED            -          0.73      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) =       0.43
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.79
    AVERAGE FLOW DEPTH(FEET) =  0.16   TRAVEL TIME(MIN.) =   0.33
    Tc(MIN.) =   9.17
    SUBAREA AREA(ACRES) =     0.73      SUBAREA RUNOFF(CFS) =   0.36
    EFFECTIVE AREA(ACRES) =     1.20     AREA-AVERAGED Fm(INCH/HR) =  0.60
    AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        1.2      PEAK FLOW RATE(CFS) =       0.59

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.18   FLOW VELOCITY(FEET/SEC.) =  6.10
    LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40512.00 =    445.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40512.00 TO NODE  40513.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    581.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  152.00   CHANNEL SLOPE = 0.4539
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   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            -          1.36      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) =       0.90
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.60
   AVERAGE FLOW DEPTH(FEET) =  0.23   TRAVEL TIME(MIN.) =   0.45
   Tc(MIN.) =   9.62
   SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =   0.61
   EFFECTIVE AREA(ACRES) =     2.56     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) =       1.15

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.25   FLOW VELOCITY(FEET/SEC.) =  5.93
   LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40513.00 =    597.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40513.00 TO NODE  40514.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    581.00  DOWNSTREAM(FEET) =    500.00
```

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   CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE = 0.4629
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.057
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED            -          2.32      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) =       1.63
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.69
   AVERAGE FLOW DEPTH(FEET) =  0.29   TRAVEL TIME(MIN.) =   0.44
   Tc(MIN.) =   10.06
   SUBAREA AREA(ACRES) =     2.32      SUBAREA RUNOFF(CFS) =   0.95
   EFFECTIVE AREA(ACRES) =     4.88     AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        4.9      PEAK FLOW RATE(CFS) =       2.01

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.31   FLOW VELOCITY(FEET/SEC.) =  7.06
   LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40514.00 =    772.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40514.00 TO NODE  40515.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    440.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  206.00   CHANNEL SLOPE = 0.2913
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.033
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED            -          2.15      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) =       2.43
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.19
   AVERAGE FLOW DEPTH(FEET) =  0.36   TRAVEL TIME(MIN.) =   0.55
   Tc(MIN.) =   10.61
   SUBAREA AREA(ACRES) =     2.15      SUBAREA RUNOFF(CFS) =   0.84
   EFFECTIVE AREA(ACRES) =     7.03     AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        7.0      PEAK FLOW RATE(CFS) =       2.74

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.38   FLOW VELOCITY(FEET/SEC.) =  6.37
   LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40515.00 =    978.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40515.00 TO NODE  40516.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    440.00  DOWNSTREAM(FEET) =    390.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  269.00   CHANNEL SLOPE = 0.1859
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.999
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        5.24     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) =      3.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.79
  AVERAGE FLOW DEPTH(FEET) =   0.46    TRAVEL TIME(MIN.) =   0.77
  Tc(MIN.) =   11.39
  SUBAREA AREA(ACRES) =     5.24       SUBAREA RUNOFF(CFS) =     1.88
  EFFECTIVE AREA(ACRES) =     12.27      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        12.3         PEAK FLOW RATE(CFS) =       4.41

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49    FLOW VELOCITY(FEET/SEC.) =   6.09
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40516.00 =   1247.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40516.00 TO NODE  40517.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    390.00  DOWNSTREAM(FEET) =    355.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  384.00   CHANNEL SLOPE = 0.0911
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.940
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        4.01     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) =      5.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.80
  AVERAGE FLOW DEPTH(FEET) =   0.59    TRAVEL TIME(MIN.) =   1.33
  Tc(MIN.) =   12.72
  SUBAREA AREA(ACRES) =     4.01       SUBAREA RUNOFF(CFS) =     1.23
  EFFECTIVE AREA(ACRES) =     16.28      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        16.3         PEAK FLOW RATE(CFS) =       4.99

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.59    FLOW VELOCITY(FEET/SEC.) =   4.77
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40517.00 =   1631.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40517.00 TO NODE  40518.00 IS CODE = 51
-------------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    341.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  512.00   CHANNEL SLOPE = 0.0273
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.846
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        8.89     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) =      5.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.99
  AVERAGE FLOW DEPTH(FEET) =   0.71    TRAVEL TIME(MIN.) =   2.14
  Tc(MIN.) =   14.86
  SUBAREA AREA(ACRES) =     8.89       SUBAREA RUNOFF(CFS) =     1.97
  EFFECTIVE AREA(ACRES) =     25.17      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        25.2         PEAK FLOW RATE(CFS) =       5.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.69    FLOW VELOCITY(FEET/SEC.) =   3.89
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40518.00 =   2143.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40518.00 TO NODE  40518.00 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.) =   14.86
  RAINFALL INTENSITY(INCH/HR) =   0.85
  AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      25.17
  TOTAL STREAM AREA(ACRES) =      25.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.58

  ** CONFLUENCE DATA **
  STREAM       Q       Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1         8.23   17.45   0.781    0.60( 0.60) 1.00    40.7   40500.00
    2         5.58   14.86   0.846    0.60( 0.60) 1.00    25.2   40510.00

  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        13.82   14.86   0.846    0.60( 0.60) 1.00    59.8   40510.00
    2        12.34   17.45   0.781    0.60( 0.60) 1.00    65.8   40500.00
```

```
   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      13.82     Tc(MIN.) =     14.86
   EFFECTIVE AREA(ACRES) =      59.80   AREA-AVERAGED Fm(INCH/HR) = 0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =     65.8
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40518.00 =   3095.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40518.00 TO NODE  40519.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    341.00   DOWNSTREAM(FEET) =    333.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   688.00   CHANNEL SLOPE = 0.0116
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.766
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED                -       3.34     0.60     1.000     -
   USER-DEFINED                -       2.15     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) =      14.23
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.56
   AVERAGE FLOW DEPTH(FEET) =  1.15   TRAVEL TIME(MIN.) =   3.22
   Tc(MIN.) =   18.08
   SUBAREA AREA(ACRES) =     5.49       SUBAREA RUNOFF(CFS) =    0.82
   EFFECTIVE AREA(ACRES) =     65.29     AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      71.3        PEAK FLOW RATE(CFS) =     13.82
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.14   FLOW VELOCITY(FEET/SEC.) =  3.55
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40519.00 =   3783.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40519.00 TO NODE  40519.00 IS CODE = 81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   MAINLINE Tc(MIN.) =   18.08
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.766
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED                -       0.35     0.60     0.500     -
   USER-DEFINED                -       4.48     0.60     1.000     -
   USER-DEFINED                -       0.38     0.60     1.000     -
   USER-DEFINED                -       1.49     0.60     1.000     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.974
   SUBAREA AREA(ACRES) =    6.70       SUBAREA RUNOFF(CFS) =    1.10
   EFFECTIVE AREA(ACRES) =     71.99   AREA-AVERAGED Fm(INCH/HR) =  0.60
```

```
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =       78.0       PEAK FLOW RATE(CFS) =     13.82
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
===========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =       78.0   TC(MIN.) =     18.08
   EFFECTIVE AREA(ACRES) =     71.99  AREA-AVERAGED Fm(INCH/HR)= 0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap = 0.998
   PEAK FLOW RATE(CFS)   =       13.82

   ** PEAK FLOW RATE TABLE **
   STREAM       Q     Tc    Intensity   Fp(Fm)     Ap     Ae    HEADWATER
   NUMBER     (CFS) (MIN.) (INCH/HR)  (INCH/HR)         (ACRES)   NODE
     1        13.82  18.08   0.766   0.60( 0.60) 1.00     72.0   40510.00
     2        12.34  20.76   0.706   0.60( 0.60) 1.00     78.0   40500.00
===========================================================================
===========================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
_____
***********************************************************************
         RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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         Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                       Analysis prepared by:

                    Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-4 WATERSHED 6 EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 2-YR EV MARCH 2019 CCHIU                                            *
  **********************************************************************

  FILE NAME: X40602EV.DAT
  TIME/DATE OF STUDY: 09:03 03/26/2019
========================================================================
  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;  0.366
  10)   90.00;  0.300
  11)  120.00;  0.246
  12)  180.00;  0.190
  13)  360.00;  0.136
  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   60.0    30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40600.00 TO NODE  40601.00 IS CODE =  21
 ------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   279.00
  ELEVATION DATA: UPSTREAM(FEET) =   1054.00  DOWNSTREAM(FEET) =   1000.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.326
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.133
  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"              -        0.54      0.60     1.000     0   9.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.26
  TOTAL AREA(ACRES) =       0.54   PEAK FLOW RATE(CFS) =       0.26


 ************************************************************************
  FLOW PROCESS FROM NODE  40601.00 TO NODE  40602.00 IS CODE =  51
 ------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    985.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   199.00    CHANNEL SLOPE = 0.0754
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 1.028
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap    SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        0.76      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) =       0.41
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.37
  AVERAGE FLOW DEPTH(FEET) =  0.24    TRAVEL TIME(MIN.) =   1.40
  Tc(MIN.) =   10.73
  SUBAREA AREA(ACRES) =      0.76       SUBAREA RUNOFF(CFS) =     0.29
  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) =       0.50

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
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```
   DEPTH(FEET) =  0.26    FLOW VELOCITY(FEET/SEC.) =   2.54
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40602.00 =    478.00 FEET.


**************************************************************************
   FLOW PROCESS FROM NODE  40602.00 TO NODE  40603.00 IS CODE =  51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    985.00  DOWNSTREAM(FEET) =    958.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  282.00   CHANNEL SLOPE =  0.0957
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.958
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap      SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -          1.11      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) =      0.68
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.95
   AVERAGE FLOW DEPTH(FEET) =  0.28    TRAVEL TIME(MIN.) =   1.59
   Tc(MIN.) =   12.32
   SUBAREA AREA(ACRES) =     1.11      SUBAREA RUNOFF(CFS) =    0.36
   EFFECTIVE AREA(ACRES) =     2.41      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       2.4        PEAK FLOW RATE(CFS) =       0.78

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.29    FLOW VELOCITY(FEET/SEC.) =   3.02
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40603.00 =    760.00 FEET.


**************************************************************************
   FLOW PROCESS FROM NODE  40603.00 TO NODE  40604.00 IS CODE =  51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    958.00  DOWNSTREAM(FEET) =    940.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  219.00   CHANNEL SLOPE =  0.0822
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.903
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap      SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -          0.36      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) =      0.83
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.90
   AVERAGE FLOW DEPTH(FEET) =  0.31    TRAVEL TIME(MIN.) =   1.26
   Tc(MIN.) =   13.58
   SUBAREA AREA(ACRES) =     0.36      SUBAREA RUNOFF(CFS) =    0.10
   EFFECTIVE AREA(ACRES) =     2.77      AREA-AVERAGED Fm(INCH/HR) =   0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       2.8        PEAK FLOW RATE(CFS) =       0.78
```

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

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.30    FLOW VELOCITY(FEET/SEC.) =   2.87
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40604.00 =    979.00 FEET.


**************************************************************************
   FLOW PROCESS FROM NODE  40604.00 TO NODE  40605.00 IS CODE =  51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    940.00  DOWNSTREAM(FEET) =    800.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  547.00   CHANNEL SLOPE =  0.2559
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.830
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap      SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -          3.00      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) =      1.09
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.91
   AVERAGE FLOW DEPTH(FEET) =  0.27    TRAVEL TIME(MIN.) =   1.86
   Tc(MIN.) =   15.43
   SUBAREA AREA(ACRES) =     3.00      SUBAREA RUNOFF(CFS) =    0.62
   EFFECTIVE AREA(ACRES) =     5.77      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) =       1.19

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.29    FLOW VELOCITY(FEET/SEC.) =   4.89
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40605.00 =   1526.00 FEET.


**************************************************************************
   FLOW PROCESS FROM NODE  40605.00 TO NODE  40606.00 IS CODE =  51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    680.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  277.00   CHANNEL SLOPE =  0.4332
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -          2.22      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) =      1.40
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.34
   AVERAGE FLOW DEPTH(FEET) =  0.27    TRAVEL TIME(MIN.) =   0.73
   Tc(MIN.) =   16.16
   SUBAREA AREA(ACRES) =     2.22      SUBAREA RUNOFF(CFS) =    0.42
```

```
     EFFECTIVE AREA(ACRES) =       7.99    AREA-AVERAGED Fm(INCH/HR) =    0.60
     AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
     TOTAL AREA(ACRES) =           8.0          PEAK FLOW RATE(CFS) =       1.53

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 0.28   FLOW VELOCITY(FEET/SEC.) =   6.52
     LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40606.00 =   1803.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  40606.00 TO NODE  40607.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =      680.00  DOWNSTREAM(FEET) =      670.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =     59.00   CHANNEL SLOPE = 0.1695
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.807
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         9.34      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) =       2.40
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.01
   AVERAGE FLOW DEPTH(FEET) =   0.40    TRAVEL TIME(MIN.) =   0.20
   Tc(MIN.) =  16.36
   SUBAREA AREA(ACRES) =       9.34       SUBAREA RUNOFF(CFS) =     1.74
   EFFECTIVE AREA(ACRES) =      17.33    AREA-AVERAGED Fm(INCH/HR) =    0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =          17.3          PEAK FLOW RATE(CFS) =       3.24

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.45   FLOW VELOCITY(FEET/SEC.) =   5.44
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40607.00 =   1862.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  40607.00 TO NODE  40608.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =      670.00  DOWNSTREAM(FEET) =      585.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    246.00   CHANNEL SLOPE = 0.3455
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.794
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         4.64      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) =       3.64
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.32
   AVERAGE FLOW DEPTH(FEET) =   0.41    TRAVEL TIME(MIN.) =   0.56
```

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   Tc(MIN.) =  16.92
   SUBAREA AREA(ACRES) =       4.64       SUBAREA RUNOFF(CFS) =     0.81
   EFFECTIVE AREA(ACRES) =      21.96    AREA-AVERAGED Fm(INCH/HR) =    0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =          22.0          PEAK FLOW RATE(CFS) =       3.84

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.41   FLOW VELOCITY(FEET/SEC.) =   7.43
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40608.00 =   2108.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  40608.00 TO NODE  40609.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =      585.00  DOWNSTREAM(FEET) =      494.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    482.00   CHANNEL SLOPE = 0.1888
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.762
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         8.61      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) =       4.47
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.13
   AVERAGE FLOW DEPTH(FEET) =   0.49    TRAVEL TIME(MIN.) =   1.31
   Tc(MIN.) =  18.23
   SUBAREA AREA(ACRES) =       8.61       SUBAREA RUNOFF(CFS) =     1.26
   EFFECTIVE AREA(ACRES) =      30.57    AREA-AVERAGED Fm(INCH/HR) =    0.60
   AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =          30.6          PEAK FLOW RATE(CFS) =       4.47

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.49   FLOW VELOCITY(FEET/SEC.) =   6.14
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40609.00 =   2590.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  40609.00 TO NODE  40610.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =      494.00  DOWNSTREAM(FEET) =      470.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    236.00   CHANNEL SLOPE = 0.1017
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.744
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        18.33      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) =       5.67
```

```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.15
  AVERAGE FLOW DEPTH(FEET) =   0.61    TRAVEL TIME(MIN.) =   0.76
  Tc(MIN.) =   18.99
  SUBAREA AREA(ACRES) =    18.33      SUBAREA RUNOFF(CFS) =    2.38
  EFFECTIVE AREA(ACRES) =    48.90      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      48.9        PEAK FLOW RATE(CFS) =        6.35

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.63   FLOW VELOCITY(FEET/SEC.) =   5.33
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40610.00 =   2826.00 FEET.

*********************************************************************
  FLOW PROCESS FROM NODE  40610.00 TO NODE  40611.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    425.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  560.00   CHANNEL SLOPE = 0.0804
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.704
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -         10.11      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) =      6.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.98
  AVERAGE FLOW DEPTH(FEET) =   0.68    TRAVEL TIME(MIN.) =   1.88
  Tc(MIN.) =   20.87
  SUBAREA AREA(ACRES) =    10.11      SUBAREA RUNOFF(CFS) =    0.95
  EFFECTIVE AREA(ACRES) =    59.01      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      59.0        PEAK FLOW RATE(CFS) =        6.35
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.66   FLOW VELOCITY(FEET/SEC.) =   4.85
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40611.00 =   3386.00 FEET.

*********************************************************************
  FLOW PROCESS FROM NODE  40611.00 TO NODE  40612.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    425.00  DOWNSTREAM(FEET) =    373.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  906.00   CHANNEL SLOPE = 0.0574
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.642
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -         20.87      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) =      6.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.35
  AVERAGE FLOW DEPTH(FEET) =   0.72    TRAVEL TIME(MIN.) =   3.47
  Tc(MIN.) =   24.34
  SUBAREA AREA(ACRES) =    20.87      SUBAREA RUNOFF(CFS) =    0.79
  EFFECTIVE AREA(ACRES) =    79.89      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      79.9        PEAK FLOW RATE(CFS) =        6.35
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.70   FLOW VELOCITY(FEET/SEC.) =   4.26
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40612.00 =   4292.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40612.00 TO NODE  40613.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    373.00  DOWNSTREAM(FEET) =    328.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1192.00   CHANNEL SLOPE = 0.0378
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *  2 YEAR RAINFALL INTENSITY(INCH/HR) = 0.578
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -         0.04       0.60      1.000      -
  USER-DEFINED             -         0.14       0.60      1.000      -
  USER-DEFINED             -         0.96       0.60      1.000      -
  USER-DEFINED             -         0.21       0.60      1.000      -
  USER-DEFINED             -         0.71       0.60      1.000      -
  USER-DEFINED             -         3.41       0.60      1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.53
  AVERAGE FLOW DEPTH(FEET) =   0.68    TRAVEL TIME(MIN.) =   4.39
  Tc(MIN.) =   28.73
  SUBAREA AREA(ACRES) =     5.47      SUBAREA RUNOFF(CFS) =    0.00
  EFFECTIVE AREA(ACRES) =    85.36      AREA-AVERAGED Fm(INCH/HR) =   0.60
  AREA-AVERAGED Fp(INCH/HR) =   0.60  AREA-AVERAGED Ap =   1.00
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =      85.4        PEAK FLOW RATE(CFS) =        6.35
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.68   FLOW VELOCITY(FEET/SEC.) =   4.53
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40613.00 =   5484.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40613.00 TO NODE  40613.00 IS CODE = 81
```

```
  -----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
  ===============================================================================
   MAINLINE Tc(MIN.) =   28.73
   *    2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.578
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED                -       0.07      0.60     1.000      -
   USER-DEFINED                -       0.69      0.60     1.000      -
   USER-DEFINED                -       0.99      0.60     1.000      -
   USER-DEFINED                -       4.13      0.60     1.000      -
   USER-DEFINED                -       0.72      0.60     1.000      -
   USER-DEFINED                -       0.26      0.60     1.000      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   SUBAREA AREA(ACRES) =    6.86      SUBAREA RUNOFF(CFS) =    0.00
   EFFECTIVE AREA(ACRES) =     92.22    AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TOTAL AREA(ACRES) =        92.2       PEAK FLOW RATE(CFS) =       6.35
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  *******************************************************************************
   FLOW PROCESS FROM NODE  40613.00 TO NODE  40613.00 IS CODE =  81
  -----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
  ===============================================================================
   MAINLINE Tc(MIN.) =   28.73
   *    2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.578
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED                -       6.92      0.60     1.000      -
   USER-DEFINED                -       2.35      0.60     1.000      -
   USER-DEFINED                -       0.47      0.60     1.000      -
   USER-DEFINED                -       3.66      0.60     1.000      -
   USER-DEFINED                -       0.31      0.60     1.000      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   SUBAREA AREA(ACRES) =   13.71       SUBAREA RUNOFF(CFS) =    0.00
   EFFECTIVE AREA(ACRES) =    105.93    AREA-AVERAGED Fm(INCH/HR) =  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
   * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
   * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
   TOTAL AREA(ACRES) =       105.9       PEAK FLOW RATE(CFS) =       6.35
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
  ===============================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =      105.9  TC(MIN.) =      28.73
   EFFECTIVE AREA(ACRES) =    105.93  AREA-AVERAGED Fm(INCH/HR)=  0.60
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.000
   PEAK FLOW RATE(CFS)   =        6.35
```

```
  ===============================================================================
  ===============================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
_____
*************************************************************************
         RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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         Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                      Analysis prepared by:

                  Michael Baker International
                  5 Hutton Centre Drive Suite 500
                       Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 3 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 5-YR EV MARCH 2019 CCHIU                                           *
 **********************************************************************

  FILE NAME: X30305EV.DAT
  TIME/DATE OF STUDY: 12:59 03/25/2019
========================================================================
  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  60.0    30.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
   2  50.0    25.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
   3  40.0    20.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
   4  30.0    15.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
   5  20.0    10.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30300.00 TO NODE  30301.00 IS CODE =  21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
  ELEVATION DATA: UPSTREAM(FEET) =    622.00  DOWNSTREAM(FEET) =   551.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.676
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.553
  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
  "CHAPARRAL,NARROWLEAF"     -        1.80      0.50     1.000     0    9.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      1.71
  TOTAL AREA(ACRES) =       1.80   PEAK FLOW RATE(CFS) =      1.71


*************************************************************************
  FLOW PROCESS FROM NODE  30301.00 TO NODE  30302.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    551.00  DOWNSTREAM(FEET) =   508.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 2187.00   CHANNEL SLOPE = 0.0197
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.901
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
     LAND USE              GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        6.70      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) =      3.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.38
  AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) = 15.30
  Tc(MIN.) =   24.98
  SUBAREA AREA(ACRES) =      6.70      SUBAREA RUNOFF(CFS) =    2.41
  EFFECTIVE AREA(ACRES) =       8.50      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       8.5         PEAK FLOW RATE(CFS) =      3.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.65   FLOW VELOCITY(FEET/SEC.) =   2.39
  LONGEST FLOWPATH FROM NODE  30300.00 TO NODE  30302.00 =    2512.00 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        8.5  TC(MIN.) =     24.98
  EFFECTIVE AREA(ACRES) =      8.50  AREA-AVERAGED Fm(INCH/HR)=  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =        3.06
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                       Michael Baker International
                      5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 4A EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 5-YR EV MARCH 2019 CCHIU                                             *
 **********************************************************************

  FILE NAME: X34A05EV.DAT
  TIME/DATE OF STUDY: 11:07 03/26/2019
================================================================================
  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   60.0    30.0      0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   50.0    25.0      0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
  3   40.0    20.0      0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
  4   30.0    15.0      0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
  5   20.0    10.0      0.020/0.020/0.020   0.67    2.00 0.0312 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  30400.00 TO NODE  30401.00 IS CODE =  21
 ------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
  ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =     580.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     8.150
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.758
  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.)
  AGRICULTURAL POOR COVER
  "ROW CROPS,STRAIGHT ROW"  -          0.26      0.50      1.000     0   8.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.29
  TOTAL AREA(ACRES) =       0.26   PEAK FLOW RATE(CFS) =       0.29

 ********************************************************************************
  FLOW PROCESS FROM NODE  30401.00 TO NODE  30402.00 IS CODE =  51
 ------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    580.00  DOWNSTREAM(FEET) =    540.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   220.00    CHANNEL SLOPE = 0.1818
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.617
  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
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        0.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.49
  AVERAGE FLOW DEPTH(FEET) =   0.22    TRAVEL TIME(MIN.) =   1.05
  Tc(MIN.) =    9.20
  SUBAREA AREA(ACRES) =    0.40       SUBAREA RUNOFF(CFS) =    0.40
  EFFECTIVE AREA(ACRES) =       0.65       AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =         0.7          PEAK FLOW RATE(CFS) =       0.66

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
 DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =  3.76
 LONGEST FLOWPATH FROM NODE 30400.00 TO NODE 30402.00 =    536.00 FEET.


*************************************************************************
 FLOW PROCESS FROM NODE 30402.00 TO NODE 30403.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    491.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  151.00   CHANNEL SLOPE = 0.3245
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.554
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED               -       0.12     0.50     1.000     -
 USER-DEFINED               -       0.86     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) =      1.12
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.35
 AVERAGE FLOW DEPTH(FEET) =  0.26   TRAVEL TIME(MIN.) =  0.47
 Tc(MIN.) =  9.67
 SUBAREA AREA(ACRES) =    0.98      SUBAREA RUNOFF(CFS) =   0.93
 EFFECTIVE AREA(ACRES) =    1.63     AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       1.6         PEAK FLOW RATE(CFS) =       1.55

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =  5.72
 LONGEST FLOWPATH FROM NODE 30400.00 TO NODE 30403.00 =    687.00 FEET.


*************************************************************************
 FLOW PROCESS FROM NODE 30403.00 TO NODE 30404.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    491.00  DOWNSTREAM(FEET) =    473.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  170.00   CHANNEL SLOPE = 0.1059
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.489
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED               -       1.00     0.50     1.000     -
 USER-DEFINED               -       1.00     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) =      2.44
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.24
 AVERAGE FLOW DEPTH(FEET) =  0.44   TRAVEL TIME(MIN.) =  0.67
 Tc(MIN.) =  10.34
 SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =   1.78
 EFFECTIVE AREA(ACRES) =     3.63     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) =       3.23

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.49   FLOW VELOCITY(FEET/SEC.) =  4.57
 LONGEST FLOWPATH FROM NODE 30400.00 TO NODE 30404.00 =    857.00 FEET.


***************************************************************************
 FLOW PROCESS FROM NODE 30404.00 TO NODE 30405.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    473.00  DOWNSTREAM(FEET) =    430.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  289.00   CHANNEL SLOPE = 0.1488
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.447
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED               -      20.80     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) =     12.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.16
 AVERAGE FLOW DEPTH(FEET) =  0.75   TRAVEL TIME(MIN.) =  0.67
 Tc(MIN.) =  11.01
 SUBAREA AREA(ACRES) =   20.80      SUBAREA RUNOFF(CFS) =  17.73
 EFFECTIVE AREA(ACRES) =    24.43     AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      24.4         PEAK FLOW RATE(CFS) =      20.83

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.92   FLOW VELOCITY(FEET/SEC.) =  8.23
 LONGEST FLOWPATH FROM NODE 30400.00 TO NODE 30405.00 =   1146.00 FEET.
=========================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)       =       24.4  TC(MIN.) =     11.01
 EFFECTIVE AREA(ACRES) =     24.43  AREA-AVERAGED Fm(INCH/HR)=  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      20.83
=========================================================================
=========================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

                   Michael Baker International
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  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 4B EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 5-YR EV MARCH 2019 CCHIU                                            *
  *********************************************************************

   FILE NAME: X34B05EV.DAT
   TIME/DATE OF STUDY: 11:28 03/25/2019
=================================================================================
   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  60.0     30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    2  50.0     25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    3  40.0     20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    4  30.0     15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    5  20.0     10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
    GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
      1. Relative Flow-Depth =  0.00 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  30410.00 TO NODE  30411.00 IS CODE =  21
-------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
  ELEVATION DATA: UPSTREAM(FEET) =   615.00  DOWNSTREAM(FEET) =    558.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.546
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.839
  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.)
  AGRICULTURAL POOR COVER
  "ROW CROPS,STRAIGHT ROW"   -         0.59      0.50      1.000     0   7.55
  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) =      0.59   PEAK FLOW RATE(CFS) =      0.71


*******************************************************************************
  FLOW PROCESS FROM NODE  30411.00 TO NODE  30412.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   558.00  DOWNSTREAM(FEET) =    534.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  137.00   CHANNEL SLOPE = 0.1752
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.769
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
      LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -         0.85      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) =        1.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.35
  AVERAGE FLOW DEPTH(FEET) =   0.30    TRAVEL TIME(MIN.) =   0.52
  Tc(MIN.) =    8.07
  SUBAREA AREA(ACRES) =     0.85       SUBAREA RUNOFF(CFS) =    0.96
  EFFECTIVE AREA(ACRES) =      1.44      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       1.4         PEAK FLOW RATE(CFS) =       1.64

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =    4.71
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30412.00 =     464.00 FEET.


************************************************************************
   FLOW PROCESS FROM NODE  30412.00 TO NODE  30413.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    534.00  DOWNSTREAM(FEET) =    504.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  204.00   CHANNEL SLOPE = 0.1471
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.674
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -         1.59      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) =       2.48
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.80
   AVERAGE FLOW DEPTH(FEET) =   0.41   TRAVEL TIME(MIN.) =   0.71
   Tc(MIN.) =    8.78
   SUBAREA AREA(ACRES) =     1.59       SUBAREA RUNOFF(CFS) =    1.68
   EFFECTIVE AREA(ACRES) =      3.02     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) =        3.19

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =    5.14
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30413.00 =     668.00 FEET.


************************************************************************
   FLOW PROCESS FROM NODE  30413.00 TO NODE  30414.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    504.00  DOWNSTREAM(FEET) =    472.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  247.00   CHANNEL SLOPE = 0.1296
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.574
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -         3.99      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) =       5.12
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.56
   AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   0.74
   Tc(MIN.) =    9.52
   SUBAREA AREA(ACRES) =     3.99       SUBAREA RUNOFF(CFS) =    3.86
   EFFECTIVE AREA(ACRES) =      7.01     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        7.0         PEAK FLOW RATE(CFS) =        6.78
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.62   FLOW VELOCITY(FEET/SEC.) =    5.86
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30414.00 =     915.00 FEET.


************************************************************************
   FLOW PROCESS FROM NODE  30414.00 TO NODE  30415.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    472.00  DOWNSTREAM(FEET) =    447.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  345.00   CHANNEL SLOPE = 0.0725
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.471
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -         6.31      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) =       9.54
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.19
   AVERAGE FLOW DEPTH(FEET) =   0.78   TRAVEL TIME(MIN.) =   1.11
   Tc(MIN.) =   10.63
   SUBAREA AREA(ACRES) =     6.31       SUBAREA RUNOFF(CFS) =    5.51
   EFFECTIVE AREA(ACRES) =     13.32     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       13.3         PEAK FLOW RATE(CFS) =       11.64

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.84   FLOW VELOCITY(FEET/SEC.) =    5.45
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30415.00 =    1260.00 FEET.


************************************************************************
   FLOW PROCESS FROM NODE  30415.00 TO NODE  30416.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =    403.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  781.00   CHANNEL SLOPE = 0.0563
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.321
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        11.95      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) =      16.06
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.39
   AVERAGE FLOW DEPTH(FEET) =   1.00   TRAVEL TIME(MIN.) =   2.41
   Tc(MIN.) =   13.04
   SUBAREA AREA(ACRES) =    11.95       SUBAREA RUNOFF(CFS) =    8.83
   EFFECTIVE AREA(ACRES) =     25.27     AREA-AVERAGED Fm(INCH/HR) =   0.50
```

```
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        25.3        PEAK FLOW RATE(CFS) =       18.68

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.06   FLOW VELOCITY(FEET/SEC.) =   5.57
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30416.00 =   2041.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30416.00 TO NODE  30417.00 IS CODE = 51
 -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     403.00  DOWNSTREAM(FEET) =     387.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    383.00   CHANNEL SLOPE = 0.0418
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.246
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
       LAND USE             GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -       2.70      0.50      1.000      -
   USER-DEFINED               -       2.80      0.50      1.000      -
   USER-DEFINED               -       2.90      0.50      1.000      -
   USER-DEFINED               -       0.90      0.50      1.000      -
   USER-DEFINED               -       0.10      0.50      1.000      -
   USER-DEFINED               -       3.20      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) =      22.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.23
   AVERAGE FLOW DEPTH(FEET) =  1.21    TRAVEL TIME(MIN.) =   1.22
   Tc(MIN.) =   14.26
   SUBAREA AREA(ACRES) =   12.60        SUBAREA RUNOFF(CFS) =    8.45
   EFFECTIVE AREA(ACRES) =      37.87     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        37.9        PEAK FLOW RATE(CFS) =       25.41

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.26   FLOW VELOCITY(FEET/SEC.) =   5.37
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30417.00 =   2424.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30417.00 TO NODE  30417.00 IS CODE = 81
 -------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =========================================================================
   MAINLINE Tc(MIN.) =   14.26
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.246
   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               -       0.10      0.50      1.000      -
   USER-DEFINED               -       0.70      0.50      1.000      -
   USER-DEFINED               -       0.20      0.50      1.000      -
   USER-DEFINED               -       0.90      0.50      1.000      -
   USER-DEFINED               -       0.10      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) =    2.60        SUBAREA RUNOFF(CFS) =    1.74
   EFFECTIVE AREA(ACRES) =      40.47    AREA-AVERAGED Fm(INCH/HR) = 0.50
   AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        40.5        PEAK FLOW RATE(CFS) =       27.16

***************************************************************************
   FLOW PROCESS FROM NODE  30417.00 TO NODE  30417.00 IS CODE = 81
 -------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =========================================================================
   MAINLINE Tc(MIN.) =   14.26
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.246
   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               -       0.30      0.50      1.000      -
   USER-DEFINED               -       0.10      0.50      1.000      -
   USER-DEFINED               -       0.10      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) =    1.50        SUBAREA RUNOFF(CFS) =    1.01
   EFFECTIVE AREA(ACRES) =      41.97    AREA-AVERAGED Fm(INCH/HR) = 0.50
   AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        42.0        PEAK FLOW RATE(CFS) =       28.16
 =========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =        42.0   TC(MIN.) =      14.26
   EFFECTIVE AREA(ACRES) =      41.97  AREA-AVERAGED Fm(INCH/HR)=  0.50
   AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)    =       28.16
 =========================================================================
 =========================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
********************************************************************
        RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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        Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                      Analysis prepared by:

                   Michael Baker International
                  5 Hutton Centre Drive Suite 500
                       Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY ************************
 * RMV PA-3 WATERSHED 5A EXISTING CONDITION                          *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                             *
 * 5-YR EV MARCH 2019 CCHIU                                          *
 ********************************************************************

  FILE NAME: X35A05EV.DAT
  TIME/DATE OF STUDY: 11:32 03/25/2019
==================================================================
   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  60.0     30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30500.00 TO NODE  30501.00 IS CODE =  21
 ------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   303.00
  ELEVATION DATA: UPSTREAM(FEET) =    769.00  DOWNSTREAM(FEET) =    695.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.201
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.617
  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"              -        1.01     0.50     1.000    0   9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       1.01
  TOTAL AREA(ACRES) =       1.01   PEAK FLOW RATE(CFS) =       1.01


 ********************************************************************
  FLOW PROCESS FROM NODE  30501.00 TO NODE  30502.00 IS CODE =  51
 ------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    695.00  DOWNSTREAM(FEET) =    665.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   167.00    CHANNEL SLOPE = 0.1796
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.534
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp       Ap    SCS
      LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -        0.89     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) =       1.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.49
  AVERAGE FLOW DEPTH(FEET) =   0.33    TRAVEL TIME(MIN.) =   0.62
  Tc(MIN.) =    9.82
  SUBAREA AREA(ACRES) =      0.89        SUBAREA RUNOFF(CFS) =    0.83
  EFFECTIVE AREA(ACRES) =       1.89      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       1.76

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   4.69
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30502.00 =    470.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30502.00 TO NODE  30503.00 IS CODE =  51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    665.00  DOWNSTREAM(FEET) =     645.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE = 0.1818
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.499
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        0.98      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) =       2.20
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.12
   AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   0.36
   Tc(MIN.) =   10.18
   SUBAREA AREA(ACRES) =     0.98      SUBAREA RUNOFF(CFS) =    0.88
   EFFECTIVE AREA(ACRES) =     2.88     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        2.9         PEAK FLOW RATE(CFS) =       2.58

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.41   FLOW VELOCITY(FEET/SEC.) =   5.19
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30503.00 =    580.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30503.00 TO NODE  30504.00 IS CODE =  51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =     630.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   152.00   CHANNEL SLOPE = 0.0987
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.465
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        3.30      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) =       4.02
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.65
   AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   0.55
   Tc(MIN.) =   10.72
   SUBAREA AREA(ACRES) =     3.30      SUBAREA RUNOFF(CFS) =    2.87
   EFFECTIVE AREA(ACRES) =     6.18     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        6.2         PEAK FLOW RATE(CFS) =       5.36
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.60   FLOW VELOCITY(FEET/SEC.) =   5.00
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30504.00 =    732.00 FEET.


****************************************************************************
   FLOW PROCESS FROM NODE  30504.00 TO NODE  30505.00 IS CODE =  51
   ---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    600.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   329.00   CHANNEL SLOPE = 0.0912
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.402
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        7.11      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) =       8.25
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.42
   AVERAGE FLOW DEPTH(FEET) =   0.71   TRAVEL TIME(MIN.) =   1.01
   Tc(MIN.) =   11.74
   SUBAREA AREA(ACRES) =      7.11      SUBAREA RUNOFF(CFS) =    5.77
   EFFECTIVE AREA(ACRES) =     13.28      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       13.3         PEAK FLOW RATE(CFS) =      10.79

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.79   FLOW VELOCITY(FEET/SEC.) =   5.78
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30505.00 =   1061.00 FEET.


****************************************************************************
   FLOW PROCESS FROM NODE  30505.00 TO NODE  30506.00 IS CODE =  51
   ---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    585.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   297.00   CHANNEL SLOPE = 0.0505
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.342
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -       10.71      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) =      14.84
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.06
   AVERAGE FLOW DEPTH(FEET) =   0.99   TRAVEL TIME(MIN.) =   0.98
   Tc(MIN.) =   12.71
   SUBAREA AREA(ACRES) =     10.71      SUBAREA RUNOFF(CFS) =    8.11
   EFFECTIVE AREA(ACRES) =     24.00      AREA-AVERAGED Fm(INCH/HR) =   0.50
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      24.0       PEAK FLOW RATE(CFS) =      18.17

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.07   FLOW VELOCITY(FEET/SEC.) =  5.28
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30506.00 =   1358.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  30506.00 TO NODE  30507.00 IS CODE =  51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     585.00  DOWNSTREAM(FEET) =     550.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    700.00   CHANNEL SLOPE = 0.0500
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.213
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED              -         15.01     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) =     22.99
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.60
 AVERAGE FLOW DEPTH(FEET) =  1.17   TRAVEL TIME(MIN.) =  2.08
 Tc(MIN.) =  14.80
 SUBAREA AREA(ACRES) =      15.01       SUBAREA RUNOFF(CFS) =      9.62
 EFFECTIVE AREA(ACRES) =      39.01     AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      39.0       PEAK FLOW RATE(CFS) =      25.01

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.21   FLOW VELOCITY(FEET/SEC.) =  5.71
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30507.00 =   2058.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  30507.00 TO NODE  30508.00 IS CODE =  51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     550.00  DOWNSTREAM(FEET) =     500.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   1107.00   CHANNEL SLOPE = 0.0452
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.096
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED              -         34.74     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) =     34.34
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.96
 AVERAGE FLOW DEPTH(FEET) =  1.39   TRAVEL TIME(MIN.) =  3.10
 Tc(MIN.) =  17.89
```

```
 SUBAREA AREA(ACRES) =      34.74       SUBAREA RUNOFF(CFS) =      18.62
 EFFECTIVE AREA(ACRES) =      73.74     AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      73.7       PEAK FLOW RATE(CFS) =      39.53

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.46   FLOW VELOCITY(FEET/SEC.) =  6.18
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30508.00 =   3165.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  30508.00 TO NODE  30518.00 IS CODE =  51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     500.00  DOWNSTREAM(FEET) =     465.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    982.00   CHANNEL SLOPE = 0.0356
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 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              -         11.69     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) =     42.17
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.77
 AVERAGE FLOW DEPTH(FEET) =  1.56   TRAVEL TIME(MIN.) =  2.84
 Tc(MIN.) =  20.73
 SUBAREA AREA(ACRES) =      11.69       SUBAREA RUNOFF(CFS) =      5.28
 EFFECTIVE AREA(ACRES) =      85.43     AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      85.4       PEAK FLOW RATE(CFS) =      39.53
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.53   FLOW VELOCITY(FEET/SEC.) =  5.64
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30518.00 =   4147.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  30518.00 TO NODE  30518.00 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.) =  20.73
 RAINFALL INTENSITY(INCH/HR) =  1.00
 AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      85.43
 TOTAL STREAM AREA(ACRES) =      85.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      39.53

***************************************************************************
 FLOW PROCESS FROM NODE  30510.00 TO NODE  30511.00 IS CODE =  21
```

```
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    315.00
  ELEVATION DATA: UPSTREAM(FEET) =    792.00  DOWNSTREAM(FEET) =     690.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     8.832
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.666
  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
  "CHAPARRAL,NARROWLEAF"      -        1.17      0.50       1.000      0     8.83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.23
  TOTAL AREA(ACRES) =        1.17   PEAK FLOW RATE(CFS) =      1.23


*****************************************************************************
  FLOW PROCESS FROM NODE  30511.00 TO NODE  30512.00 IS CODE = 51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    690.00  DOWNSTREAM(FEET) =     650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    182.00   CHANNEL SLOPE =  0.2198
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.592
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp          Ap      SCS
       LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED               -        2.22      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) =       2.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.46
  AVERAGE FLOW DEPTH(FEET) =   0.38    TRAVEL TIME(MIN.) =    0.56
  Tc(MIN.) =    9.39
  SUBAREA AREA(ACRES) =     2.22      SUBAREA RUNOFF(CFS) =    2.18
  EFFECTIVE AREA(ACRES) =      3.39    AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       3.34

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   6.01
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30512.00 =     497.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30512.00 TO NODE  30513.00 IS CODE = 51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =     610.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    352.00   CHANNEL SLOPE =  0.1136
```

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  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp          Ap      SCS
       LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED               -        2.07      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) =       4.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.01
  AVERAGE FLOW DEPTH(FEET) =   0.53    TRAVEL TIME(MIN.) =    1.17
  Tc(MIN.) =    10.56
  SUBAREA AREA(ACRES) =     2.07      SUBAREA RUNOFF(CFS) =    1.82
  EFFECTIVE AREA(ACRES) =       5.46     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        5.5       PEAK FLOW RATE(CFS) =       4.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   5.21
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30513.00 =     849.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30513.00 TO NODE  30514.00 IS CODE = 51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =     605.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =     49.00   CHANNEL SLOPE =  0.1020
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   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               -        6.01      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) =       7.41
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.53
  AVERAGE FLOW DEPTH(FEET) =   0.67    TRAVEL TIME(MIN.) =    0.15
  Tc(MIN.) =    10.71
  SUBAREA AREA(ACRES) =     6.01      SUBAREA RUNOFF(CFS) =    5.23
  EFFECTIVE AREA(ACRES) =      11.47     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =       9.98

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.75   FLOW VELOCITY(FEET/SEC.) =   5.90
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30514.00 =     898.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30514.00 TO NODE  30515.00 IS CODE = 51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =     600.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   29.00   CHANNEL SLOPE = 0.1724
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.462
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -        4.23      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) =     11.81
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.55
   AVERAGE FLOW DEPTH(FEET) =  0.72   TRAVEL TIME(MIN.) =   0.06
   Tc(MIN.) =  10.77
   SUBAREA AREA(ACRES) =     4.23       SUBAREA RUNOFF(CFS) =    3.67
   EFFECTIVE AREA(ACRES) =    15.71     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       15.7        PEAK FLOW RATE(CFS) =      13.60

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.76   FLOW VELOCITY(FEET/SEC.) =  7.85
   LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30515.00 =    927.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30515.00 TO NODE  30516.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =     574.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  444.00   CHANNEL SLOPE = 0.0586
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.378
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -        6.53      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) =     16.18
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.45
   AVERAGE FLOW DEPTH(FEET) =  0.99   TRAVEL TIME(MIN.) =   1.36
   Tc(MIN.) =  12.13
   SUBAREA AREA(ACRES) =     6.53       SUBAREA RUNOFF(CFS) =    5.16
   EFFECTIVE AREA(ACRES) =    22.23     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       22.2        PEAK FLOW RATE(CFS) =      17.57

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.03   FLOW VELOCITY(FEET/SEC.) =  5.57
   LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30516.00 =   1371.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30516.00 TO NODE  30517.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =     519.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1042.00   CHANNEL SLOPE = 0.0528
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.192
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -       12.01      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) =     21.32
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.62
   AVERAGE FLOW DEPTH(FEET) =  1.12   TRAVEL TIME(MIN.) =   3.09
   Tc(MIN.) =  15.22
   SUBAREA AREA(ACRES) =    12.01       SUBAREA RUNOFF(CFS) =    7.48
   EFFECTIVE AREA(ACRES) =    34.24     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       34.2        PEAK FLOW RATE(CFS) =      21.33

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.12   FLOW VELOCITY(FEET/SEC.) =  5.62
   LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30517.00 =   2413.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30517.00 TO NODE  30518.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    519.00  DOWNSTREAM(FEET) =     465.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1223.00   CHANNEL SLOPE = 0.0442
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.060
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -       22.15      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) =     26.92
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.57
   AVERAGE FLOW DEPTH(FEET) =  1.27   TRAVEL TIME(MIN.) =   3.66
   Tc(MIN.) =  18.88
   SUBAREA AREA(ACRES) =    22.15       SUBAREA RUNOFF(CFS) =   11.17
   EFFECTIVE AREA(ACRES) =    56.39     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       56.4        PEAK FLOW RATE(CFS) =      28.43

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.29   FLOW VELOCITY(FEET/SEC.) =  5.66
   LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30518.00 =   3636.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30518.00 TO NODE  30518.00 IS CODE =  1
```

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--------------------------------------------------------------------------------
 >>>>>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.) =   18.88
 RAINFALL INTENSITY(INCH/HR) =   1.06
 AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      56.39
 TOTAL STREAM AREA(ACRES) =       56.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.43

 ** CONFLUENCE DATA **
 STREAM       Q      Tc    Intensity  Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR)  (INCH/HR)       (ACRES)    NODE
    1       39.53   20.73   1.002   0.50( 0.50) 1.00     85.4  30500.00
    2       28.43   18.88   1.060   0.50( 0.50) 1.00     56.4  30510.00

 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       67.97   18.88   1.060   0.50( 0.50) 1.00    134.2  30510.00
    2       65.02   20.73   1.002   0.50( 0.50) 1.00    141.8  30500.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       67.97    Tc(MIN.) =     18.88
 EFFECTIVE AREA(ACRES) =     134.18   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       141.8
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30518.00 =   4147.00 FEET.

*******************************************************************************
 FLOW PROCESS FROM NODE  30518.00 TO NODE  30519.00 IS CODE =  51
--------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =     448.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    451.00   CHANNEL SLOPE = 0.0377
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.020
 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            -         0.50     0.50      1.000     -
 USER-DEFINED            -         2.40     0.50      0.000     -
 USER-DEFINED            -         2.70     0.50      1.000     -
 USER-DEFINED            -         0.10     0.50      1.000     -
 USER-DEFINED            -         0.80     0.50      1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
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 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.671
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     70.21
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.66
 AVERAGE FLOW DEPTH(FEET) =  1.87   TRAVEL TIME(MIN.) =   1.13
 Tc(MIN.) =   20.00
 SUBAREA AREA(ACRES) =      7.30       SUBAREA RUNOFF(CFS) =     4.49
 EFFECTIVE AREA(ACRES) =     141.48    AREA-AVERAGED Fm(INCH/HR) =   0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   0.98
 TOTAL AREA(ACRES) =        149.1         PEAK FLOW RATE(CFS) =       67.97
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.85   FLOW VELOCITY(FEET/SEC.) =  6.61
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30519.00 =   4598.00 FEET.

*******************************************************************************
 FLOW PROCESS FROM NODE  30519.00 TO NODE  30519.00 IS CODE =  81
--------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 MAINLINE Tc(MIN.) =   20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.020
 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            -         0.10     0.50      1.000     -
 USER-DEFINED            -         2.80     0.50      1.000     -
 USER-DEFINED            -         0.20     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) =      3.80       SUBAREA RUNOFF(CFS) =     1.78
 EFFECTIVE AREA(ACRES) =     145.28    AREA-AVERAGED Fm(INCH/HR) =   0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   0.98
 TOTAL AREA(ACRES) =        152.9         PEAK FLOW RATE(CFS) =       69.03
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)        =      152.9   TC(MIN.) =      20.00
 EFFECTIVE AREA(ACRES) =     145.28   AREA-AVERAGED Fm(INCH/HR)=  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 0.983
 PEAK FLOW RATE(CFS)     =      69.03

 ** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc    Intensity  Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR)  (INCH/HR)       (ACRES)    NODE
    1       69.03   20.00   1.020   0.50( 0.49) 0.98    145.3  30510.00
    2       66.44   21.87   0.975   0.50( 0.49) 0.98    152.9  30500.00
================================================================================
================================================================================
 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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                       5 Hutton Centre Drive Suite 500
                           Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY ************************
 * RMV PA-3 WATERSHED 5B EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 5-YR EV MARCH 2019 CCHIU                                             *
 **********************************************************************

  FILE NAME: X35B05EV.DAT
  TIME/DATE OF STUDY: 11:37 03/25/2019
================================================================================
   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  60.0    30.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
   2  50.0    25.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
   3  40.0    20.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
   4  30.0    15.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
   5  20.0    10.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30530.00 TO NODE  30531.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   318.00
  ELEVATION DATA: UPSTREAM(FEET) =    696.00  DOWNSTREAM(FEET) =    605.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.088
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.632
  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
  "CHAPARRAL,BROADLEAF"     -        0.05     0.50     1.000     0    9.09
  NATURAL FAIR COVER
  "OPEN BRUSH"             -        0.48     0.50     1.000     0    9.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.54
  TOTAL AREA(ACRES) =       0.53   PEAK FLOW RATE(CFS) =       0.54


********************************************************************************
  FLOW PROCESS FROM NODE  30531.00 TO NODE  30532.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    575.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   123.00    CHANNEL SLOPE = 0.2439
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.572
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
     LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        0.25     0.50     1.000     -
  USER-DEFINED             -        0.62     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) =       0.96
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.59
  AVERAGE FLOW DEPTH(FEET) =  0.26    TRAVEL TIME(MIN.) =   0.45
  Tc(MIN.) =     9.53
  SUBAREA AREA(ACRES) =     0.87       SUBAREA RUNOFF(CFS) =     0.84
  EFFECTIVE AREA(ACRES) =      1.40     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
```

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   TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =        1.35


   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.30   FLOW VELOCITY(FEET/SEC.) =   4.99
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30532.00 =    441.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30532.00 TO NODE  30533.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    575.00  DOWNSTREAM(FEET) =     565.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =     67.00   CHANNEL SLOPE = 0.1493
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.539
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -         0.45     0.50      1.000     -
   USER-DEFINED               -         0.47     0.50      1.000     -
   USER-DEFINED               -         0.01     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) =        1.79
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.51
   AVERAGE FLOW DEPTH(FEET) =  0.36   TRAVEL TIME(MIN.) =   0.25
   Tc(MIN.) =   9.78
   SUBAREA AREA(ACRES) =     0.93       SUBAREA RUNOFF(CFS) =    0.87
   EFFECTIVE AREA(ACRES) =      2.33     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =        2.18

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.39   FLOW VELOCITY(FEET/SEC.) =   4.68
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30533.00 =    508.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30533.00 TO NODE  30534.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =     540.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    172.00   CHANNEL SLOPE = 0.1453
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.488
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -         0.01     0.50      1.000     -
   USER-DEFINED               -         0.65     0.50      1.000     -
   USER-DEFINED               -         0.52     0.50      1.000     -
   USER-DEFINED               -         0.36     0.50      1.000     -
   USER-DEFINED               -         0.01     0.50      1.000     -
   USER-DEFINED               -         0.34     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) =        3.02
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.03
   AVERAGE FLOW DEPTH(FEET) =  0.45   TRAVEL TIME(MIN.) =   0.57
   Tc(MIN.) =   10.35
   SUBAREA AREA(ACRES) =     1.89       SUBAREA RUNOFF(CFS) =    1.68
   EFFECTIVE AREA(ACRES) =      4.22     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) =        3.75

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.49   FLOW VELOCITY(FEET/SEC.) =   5.31
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30534.00 =    680.00 FEET.

***************************************************************************************
   FLOW PROCESS FROM NODE  30534.00 TO NODE  30535.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    510.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    302.00   CHANNEL SLOPE = 0.0993
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.425
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -         0.58     0.50      1.000     -
   USER-DEFINED               -         0.16     0.50      1.000     -
   USER-DEFINED               -         0.03     0.50      1.000     -
   USER-DEFINED               -         1.37     0.50      1.000     -
   USER-DEFINED               -         0.22     0.50      1.000     -
   USER-DEFINED               -         0.41     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) =        4.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.94
   AVERAGE FLOW DEPTH(FEET) =  0.58   TRAVEL TIME(MIN.) =   1.02
   Tc(MIN.) =   11.37
   SUBAREA AREA(ACRES) =     2.77       SUBAREA RUNOFF(CFS) =    2.31
   EFFECTIVE AREA(ACRES) =      6.99     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        7.0        PEAK FLOW RATE(CFS) =        5.82

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.61   FLOW VELOCITY(FEET/SEC.) =   5.16
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30535.00 =    982.00 FEET.

***************************************************************************************
   FLOW PROCESS FROM NODE  30535.00 TO NODE  30535.00 IS CODE = 81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   11.37
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.425
   SUBAREA LOSS RATE DATA(AMC II):
```

```
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED             -         0.36       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) =      0.36       SUBAREA RUNOFF(CFS) =     0.30
     EFFECTIVE AREA(ACRES) =       7.35    AREA-AVERAGED Fm(INCH/HR) =  0.50
     AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =        7.3        PEAK FLOW RATE(CFS) =        6.12

******************************************************************************
   FLOW PROCESS FROM NODE  30535.00 TO NODE  30536.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     510.00  DOWNSTREAM(FEET) =      490.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   356.00   CHANNEL SLOPE = 0.0562
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.344
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         0.85       0.50      1.000      -
   USER-DEFINED              -         0.32       0.50      1.000      -
   USER-DEFINED              -         0.09       0.50      1.000      -
   USER-DEFINED              -         2.69       0.50      1.000      -
   USER-DEFINED              -         0.84       0.50      1.000      -
   USER-DEFINED              -         1.63       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) =        8.56
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.56
   AVERAGE FLOW DEPTH(FEET) =  0.79    TRAVEL TIME(MIN.) =   1.30
   Tc(MIN.) =   12.67
   SUBAREA AREA(ACRES) =      6.42       SUBAREA RUNOFF(CFS) =     4.88
   EFFECTIVE AREA(ACRES) =      13.77     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        13.8        PEAK FLOW RATE(CFS) =       10.46

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.85    FLOW VELOCITY(FEET/SEC.) =   4.81
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30536.00 =    1338.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  30536.00 TO NODE  30536.00 IS CODE = 81
------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   MAINLINE Tc(MIN.) =   12.67
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.344
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         0.45       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) =    0.45      SUBAREA RUNOFF(CFS) =     0.34
   EFFECTIVE AREA(ACRES) =     14.22     AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       14.2        PEAK FLOW RATE(CFS) =       10.80

******************************************************************************
   FLOW PROCESS FROM NODE  30536.00 TO NODE  30537.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     490.00  DOWNSTREAM(FEET) =     455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   556.00   CHANNEL SLOPE = 0.0629
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.236
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         0.49       0.50      1.000      -
   USER-DEFINED              -         2.10       0.50      1.000      -
   USER-DEFINED              -         0.33       0.50      1.000      -
   USER-DEFINED              -         0.39       0.50      1.000      -
   USER-DEFINED              -         3.76       0.50      1.000      -
   USER-DEFINED              -         0.02       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) =        13.15
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.29
   AVERAGE FLOW DEPTH(FEET) =  0.91    TRAVEL TIME(MIN.) =   1.75
   Tc(MIN.) =   14.42
   SUBAREA AREA(ACRES) =      7.09       SUBAREA RUNOFF(CFS) =     4.69
   EFFECTIVE AREA(ACRES) =      21.31     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        21.3        PEAK FLOW RATE(CFS) =       14.11

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.93    FLOW VELOCITY(FEET/SEC.) =   5.39
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30537.00 =    1894.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  30537.00 TO NODE  30537.00 IS CODE = 81
------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   MAINLINE Tc(MIN.) =   14.42
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.236
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         0.49       0.50      1.000      -
   USER-DEFINED              -         3.83       0.50      1.000      -
   USER-DEFINED              -         0.39       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) =    4.71      SUBAREA RUNOFF(CFS) =     3.12
   EFFECTIVE AREA(ACRES) =     26.02   AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
```

```
   TOTAL AREA(ACRES) =        26.0      PEAK FLOW RATE(CFS) =       17.23


*****************************************************************************
  FLOW PROCESS FROM NODE  30537.00 TO NODE  30538.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    417.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   569.00   CHANNEL SLOPE =  0.0668
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.169
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap     SCS
      LAND USE             GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       35.49     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) =      27.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.54
  AVERAGE FLOW DEPTH(FEET) =   1.19   TRAVEL TIME(MIN.) =   1.45
  Tc(MIN.) =   15.87
  SUBAREA AREA(ACRES) =     35.49       SUBAREA RUNOFF(CFS) =   21.35
  EFFECTIVE AREA(ACRES) =      61.51      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        61.5          PEAK FLOW RATE(CFS) =       37.00

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.32   FLOW VELOCITY(FEET/SEC.) =   7.05
  LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30538.00 =    2463.00 FEET.
===========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        61.5  TC(MIN.) =      15.87
  EFFECTIVE AREA(ACRES) =      61.51  AREA-AVERAGED Fm(INCH/HR)=  0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.000
  PEAK FLOW RATE(CFS)   =        37.00
===========================================================================
===========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                        Michael Baker International
                       5 Hutton Centre Drive Suite 500
                            Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 5C EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 5-YR EV MARCH 2019 CCHIU                                           *
 **********************************************************************

  FILE NAME: X35C05EV.DAT
  TIME/DATE OF STUDY: 11:08 03/26/2019
================================================================================
   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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30550.00 TO NODE  30551.00 IS CODE =  21
------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    865.00  DOWNSTREAM(FEET) =    700.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.249
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.745
  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
  "CHAPARRAL,BROADLEAF"      -         1.55     0.50     1.000    0    8.25
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.73
  TOTAL AREA(ACRES) =       1.55   PEAK FLOW RATE(CFS) =      1.73


********************************************************************************
  FLOW PROCESS FROM NODE  30551.00 TO NODE  30552.00 IS CODE =  51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    700.00  DOWNSTREAM(FEET) =    685.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   304.00   CHANNEL SLOPE = 0.0493
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.529
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap     SCS
     LAND USE              GROUP     (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -         1.49     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) =       2.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.15
  AVERAGE FLOW DEPTH(FEET) =   0.51    TRAVEL TIME(MIN.) =   1.61
  Tc(MIN.) =    9.86
  SUBAREA AREA(ACRES) =    1.49       SUBAREA RUNOFF(CFS) =   1.38
  EFFECTIVE AREA(ACRES) =      3.03     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) =      2.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
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```
   DEPTH(FEET) =  0.53   FLOW VELOCITY(FEET/SEC.) =   3.32
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30552.00 =     634.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  30552.00 TO NODE  30553.00 IS CODE = 51
----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    685.00  DOWNSTREAM(FEET) =    650.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   84.00   CHANNEL SLOPE = 0.4167
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.508
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         3.11      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) =      4.22
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.10
   AVERAGE FLOW DEPTH(FEET) =  0.42   TRAVEL TIME(MIN.) =   0.17
   Tc(MIN.) =   10.03
   SUBAREA AREA(ACRES) =     3.11       SUBAREA RUNOFF(CFS) =    2.82
   EFFECTIVE AREA(ACRES) =      6.15      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) =        5.58

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.46   FLOW VELOCITY(FEET/SEC.) =   8.69
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30553.00 =     718.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  30553.00 TO NODE  30554.00 IS CODE = 51
----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    620.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  370.00   CHANNEL SLOPE = 0.0811
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -         3.21      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) =      6.92
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.96
   AVERAGE FLOW DEPTH(FEET) =  0.68   TRAVEL TIME(MIN.) =   1.24
   Tc(MIN.) =   11.27
   SUBAREA AREA(ACRES) =     3.21       SUBAREA RUNOFF(CFS) =    2.69
   EFFECTIVE AREA(ACRES) =      9.35      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         9.4          PEAK FLOW RATE(CFS) =        7.83
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.71   FLOW VELOCITY(FEET/SEC.) =   5.15
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30554.00 =    1088.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30554.00 TO NODE  30555.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =    604.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  151.00   CHANNEL SLOPE = 0.1060
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.407
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        14.25      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) =     13.65
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.53
   AVERAGE FLOW DEPTH(FEET) =  0.83   TRAVEL TIME(MIN.) =   0.39
   Tc(MIN.) =   11.66
   SUBAREA AREA(ACRES) =    14.25       SUBAREA RUNOFF(CFS) =   11.63
   EFFECTIVE AREA(ACRES) =     23.60      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        23.6          PEAK FLOW RATE(CFS) =       19.26

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.95   FLOW VELOCITY(FEET/SEC.) =   7.10
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30555.00 =    1239.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30555.00 TO NODE  30556.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    604.00  DOWNSTREAM(FEET) =    543.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1099.00   CHANNEL SLOPE = 0.0555
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.220
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        23.90      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) =     27.05
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.08
   AVERAGE FLOW DEPTH(FEET) =  1.22   TRAVEL TIME(MIN.) =   3.01
   Tc(MIN.) =   14.67
   SUBAREA AREA(ACRES) =    23.90       SUBAREA RUNOFF(CFS) =   15.49
   EFFECTIVE AREA(ACRES) =     47.50      AREA-AVERAGED Fm(INCH/HR) =   0.50
```

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  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        47.5        PEAK FLOW RATE(CFS) =        30.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.28   FLOW VELOCITY(FEET/SEC.) =   6.28
  LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30556.00 =    2338.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30556.00 TO NODE  30557.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     543.00  DOWNSTREAM(FEET) =     503.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1074.00   CHANNEL SLOPE = 0.0372
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =    3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.098
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        23.19      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) =      37.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.66
  AVERAGE FLOW DEPTH(FEET) =   1.48   TRAVEL TIME(MIN.) =    3.16
  Tc(MIN.) =   17.83
  SUBAREA AREA(ACRES) =      23.19        SUBAREA RUNOFF(CFS) =   12.47
  EFFECTIVE AREA(ACRES) =      70.69      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        70.7        PEAK FLOW RATE(CFS) =        38.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.49   FLOW VELOCITY(FEET/SEC.) =   5.69
  LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30557.00 =    3412.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30557.00 TO NODE  30558.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     503.00  DOWNSTREAM(FEET) =     460.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1155.00   CHANNEL SLOPE = 0.0372
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =    3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.997
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        59.03      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) =      51.25
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.14
  AVERAGE FLOW DEPTH(FEET) =   1.67   TRAVEL TIME(MIN.) =    3.14
  Tc(MIN.) =   20.97
```

```
  SUBAREA AREA(ACRES) =      59.03        SUBAREA RUNOFF(CFS) =   26.38
  EFFECTIVE AREA(ACRES) =     129.73      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       129.7        PEAK FLOW RATE(CFS) =        57.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.75   FLOW VELOCITY(FEET/SEC.) =   6.31
  LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30558.00 =    4567.00 FEET.

***********************************************************************************
  FLOW PROCESS FROM NODE  30558.00 TO NODE  30559.00 IS CODE = 51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     460.00  DOWNSTREAM(FEET) =     399.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1322.00   CHANNEL SLOPE = 0.0461
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =    3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.922
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        45.38      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) =      66.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.11
  AVERAGE FLOW DEPTH(FEET) =   1.77   TRAVEL TIME(MIN.) =    3.10
  Tc(MIN.) =   24.07
  SUBAREA AREA(ACRES) =      45.38        SUBAREA RUNOFF(CFS) =   17.24
  EFFECTIVE AREA(ACRES) =     175.11      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       175.1        PEAK FLOW RATE(CFS) =        66.53

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.77   FLOW VELOCITY(FEET/SEC.) =   7.10
  LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30559.00 =    5889.00 FEET.

***********************************************************************************
  FLOW PROCESS FROM NODE  30559.00 TO NODE  30560.00 IS CODE = 51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     399.00  DOWNSTREAM(FEET) =     375.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 373.00   CHANNEL SLOPE = 0.0643
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =    3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.904
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        12.10      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) =      68.73
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.10
```

```
  AVERAGE FLOW DEPTH(FEET) =   1.68    TRAVEL TIME(MIN.) =   0.77
  Tc(MIN.) =   24.84
  SUBAREA AREA(ACRES) =    12.10       SUBAREA RUNOFF(CFS) =    4.40
  EFFECTIVE AREA(ACRES) =    187.21      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      187.2        PEAK FLOW RATE(CFS) =       68.02

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =   1.68   FLOW VELOCITY(FEET/SEC.) =   8.08
  LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30560.00 =    6262.00 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       187.2  TC(MIN.) =     24.84
  EFFECTIVE AREA(ACRES) =    187.21  AREA-AVERAGED Fm(INCH/HR)=   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       68.02
================================================================================
================================================================================
  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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                       Analysis prepared by:

                    Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 5D EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 5-YR EV MARCH 2019 CCHIU                                            *
  *********************************************************************

   FILE NAME: X35D05EV.DAT
   TIME/DATE OF STUDY: 11:55 03/25/2019
 ==============================================================================
   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   60.0    30.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  30520.00 TO NODE  30521.00 IS CODE =  21
 ----------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ======================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   315.00
   ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    692.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.937
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.786
   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
   "CHAPARRAL,BROADLEAF"     -         1.83      0.50     1.000    0   7.94
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =       2.12
   TOTAL AREA(ACRES) =       1.83   PEAK FLOW RATE(CFS) =       2.12


 **********************************************************************
   FLOW PROCESS FROM NODE  30521.00 TO NODE  30522.00 IS CODE =  51
 ----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    692.00  DOWNSTREAM(FEET) =    670.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   148.00    CHANNEL SLOPE = 0.1486
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.718
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         0.75      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) =       2.53
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.85
   AVERAGE FLOW DEPTH(FEET) =   0.42    TRAVEL TIME(MIN.) =   0.51
   Tc(MIN.) =    8.45
   SUBAREA AREA(ACRES) =      0.75       SUBAREA RUNOFF(CFS) =    0.82
   EFFECTIVE AREA(ACRES) =      2.57      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) =      2.82

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   5.04
    LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30522.00 =    463.00 FEET.


***********************************************************************
    FLOW PROCESS FROM NODE  30522.00 TO NODE  30523.00 IS CODE = 51
-----------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    670.00  DOWNSTREAM(FEET) =    654.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  104.00   CHANNEL SLOPE = 0.1538
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.676
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
          LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -        1.72      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) =      3.73
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.44
    AVERAGE FLOW DEPTH(FEET) =  0.48   TRAVEL TIME(MIN.) =  0.32
    Tc(MIN.) =   8.76
    SUBAREA AREA(ACRES) =    1.72      SUBAREA RUNOFF(CFS) =    1.81
    EFFECTIVE AREA(ACRES) =    4.29     AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =      4.3        PEAK FLOW RATE(CFS) =      4.54

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =   5.68
    LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30523.00 =    567.00 FEET.


***********************************************************************
    FLOW PROCESS FROM NODE  30523.00 TO NODE  30524.00 IS CODE = 51
-----------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    654.00  DOWNSTREAM(FEET) =    615.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  378.00   CHANNEL SLOPE = 0.1032
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.516
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
          LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -        3.19      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) =      6.00
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.28
    AVERAGE FLOW DEPTH(FEET) =  0.62   TRAVEL TIME(MIN.) =  1.19
    Tc(MIN.) =   9.96
    SUBAREA AREA(ACRES) =    3.19      SUBAREA RUNOFF(CFS) =    2.92
    EFFECTIVE AREA(ACRES) =    7.48     AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =      7.5        PEAK FLOW RATE(CFS) =      6.84
```

```
    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.65   FLOW VELOCITY(FEET/SEC.) =   5.47
    LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30524.00 =    945.00 FEET.


***************************************************************************
    FLOW PROCESS FROM NODE  30524.00 TO NODE  30525.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    593.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  190.00   CHANNEL SLOPE = 0.1158
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.481
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
          LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -        6.94      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) =      9.90
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.23
    AVERAGE FLOW DEPTH(FEET) =  0.73   TRAVEL TIME(MIN.) =  0.51
    Tc(MIN.) =  10.46
    SUBAREA AREA(ACRES) =    6.94      SUBAREA RUNOFF(CFS) =    6.13
    EFFECTIVE AREA(ACRES) =   14.42     AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =     14.4        PEAK FLOW RATE(CFS) =     12.73

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.80   FLOW VELOCITY(FEET/SEC.) =   6.66
    LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30525.00 =   1135.00 FEET.


***************************************************************************
    FLOW PROCESS FROM NODE  30525.00 TO NODE  30526.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    593.00  DOWNSTREAM(FEET) =    545.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  642.00   CHANNEL SLOPE = 0.0748
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.370
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
          LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -        9.38      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) =     16.41
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.98
    AVERAGE FLOW DEPTH(FEET) =  0.96   TRAVEL TIME(MIN.) =  1.79
    Tc(MIN.) =  12.25
    SUBAREA AREA(ACRES) =    9.38      SUBAREA RUNOFF(CFS) =    7.34
    EFFECTIVE AREA(ACRES) =   23.80     AREA-AVERAGED Fm(INCH/HR) =   0.50
```

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  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        23.8        PEAK FLOW RATE(CFS) =       18.64

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.00   FLOW VELOCITY(FEET/SEC.) =   6.18
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30526.00 =   1777.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  30526.00 TO NODE  30527.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    483.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1032.00   CHANNEL SLOPE = 0.0601
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   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                -       21.43      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) =     25.38
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.16
  AVERAGE FLOW DEPTH(FEET) =   1.17   TRAVEL TIME(MIN.) =   2.79
  Tc(MIN.) =   15.05
  SUBAREA AREA(ACRES) =    21.43        SUBAREA RUNOFF(CFS) =   13.46
  EFFECTIVE AREA(ACRES) =     45.23      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        45.2        PEAK FLOW RATE(CFS) =       28.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.22   FLOW VELOCITY(FEET/SEC.) =   6.33
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30527.00 =   2809.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  30527.00 TO NODE  30528.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    483.00  DOWNSTREAM(FEET) =    456.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   473.00   CHANNEL SLOPE = 0.0571
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.154
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap       SCS
      LAND USE              GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED                -       11.90      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) =     31.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.37
  AVERAGE FLOW DEPTH(FEET) =   1.29   TRAVEL TIME(MIN.) =   1.24
  Tc(MIN.) =   16.28
```

```
  SUBAREA AREA(ACRES) =    11.90        SUBAREA RUNOFF(CFS) =    7.00
  EFFECTIVE AREA(ACRES) =     57.13      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        57.1        PEAK FLOW RATE(CFS) =       33.60

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.32   FLOW VELOCITY(FEET/SEC.) =   6.48
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30528.00 =   3282.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =       57.1  TC(MIN.) =     16.28
  EFFECTIVE AREA(ACRES) =      57.13  AREA-AVERAGED Fm(INCH/HR)=  0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)     =       33.60
==============================================================================
==============================================================================
  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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                        Analysis prepared by:

                        Michael Baker International
                        5 Hutton Centre Drive Suite 500
                             Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 6 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 5-YR EV MARCH 2019 CCHIU                                             *
 ********************************************************************************

  FILE NAME: X30605EV.DAT
  TIME/DATE OF STUDY: 13:01 03/25/2019
================================================================================
   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  60.0     30.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
   2  50.0     25.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
   3  40.0     20.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
   4  30.0     15.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
   5  20.0     10.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30600.00 TO NODE  30601.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   328.00
   ELEVATION DATA: UPSTREAM(FEET) =    552.00  DOWNSTREAM(FEET) =    508.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.706
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.466
   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"             -       0.29     0.50     1.000     0  10.71
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =      0.25
   TOTAL AREA(ACRES) =       0.29   PEAK FLOW RATE(CFS) =      0.25


********************************************************************************
   FLOW PROCESS FROM NODE  30601.00 TO NODE  30602.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    508.00  DOWNSTREAM(FEET) =    480.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   176.00   CHANNEL SLOPE = 0.1591
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.406
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA     Fp        Ap     SCS
      LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -       0.29     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) =       0.37
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.04
   AVERAGE FLOW DEPTH(FEET) =  0.20    TRAVEL TIME(MIN.) =   0.97
   Tc(MIN.) =   11.67
   SUBAREA AREA(ACRES) =     0.29       SUBAREA RUNOFF(CFS) =   0.24
   EFFECTIVE AREA(ACRES) =      0.58      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       0.47

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   3.31
    LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30602.00 =    504.00 FEET.


*************************************************************************
  FLOW PROCESS FROM NODE  30602.00 TO NODE  30603.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    480.00  DOWNSTREAM(FEET) =    401.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   326.00   CHANNEL SLOPE = 0.2423
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.328
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.76      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) =       0.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.32
  AVERAGE FLOW DEPTH(FEET) =  0.24   TRAVEL TIME(MIN.) =   1.26
  Tc(MIN.) =   12.93
  SUBAREA AREA(ACRES) =     0.76      SUBAREA RUNOFF(CFS) =    0.56
  EFFECTIVE AREA(ACRES) =      1.34     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) =       1.00

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.27   FLOW VELOCITY(FEET/SEC.) =   4.56
  LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30603.00 =    830.00 FEET.


*************************************************************************
  FLOW PROCESS FROM NODE  30603.00 TO NODE  30604.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    401.00  DOWNSTREAM(FEET) =    385.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   106.00   CHANNEL SLOPE = 0.1509
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   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               -        0.33      0.50      1.000      -
  USER-DEFINED               -        0.62      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) =       1.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.22
  AVERAGE FLOW DEPTH(FEET) =  0.33   TRAVEL TIME(MIN.) =   0.42
  Tc(MIN.) =   13.35
  SUBAREA AREA(ACRES) =     0.95      SUBAREA RUNOFF(CFS) =    0.69
  EFFECTIVE AREA(ACRES) =      2.29     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
```

```
    TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =        1.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   4.39
  LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30604.00 =    936.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE =  81
-------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
  MAINLINE Tc(MIN.) =  13.35
  *   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               -        1.27      0.50      1.000      -
  USER-DEFINED               -        0.26      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) =    1.53      SUBAREA RUNOFF(CFS) =    1.10
  EFFECTIVE AREA(ACRES) =      3.82    AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =       2.76

*************************************************************************
  FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE =  81
-------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
  MAINLINE Tc(MIN.) =  13.35
  *   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               -        1.01      0.50      1.000      -
  USER-DEFINED               -        0.29      0.50      1.000      -
  USER-DEFINED               -        0.99      0.50      1.000      -
  USER-DEFINED               -        2.11      0.50      1.000      -
  USER-DEFINED               -        1.41      0.50      1.000      -
  USER-DEFINED               -        0.02      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) =    5.83      SUBAREA RUNOFF(CFS) =    4.21
  EFFECTIVE AREA(ACRES) =      9.65    AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.6        PEAK FLOW RATE(CFS) =       6.96

*************************************************************************
  FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE =  81
-------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
  MAINLINE Tc(MIN.) =  13.35
  *   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              -         0.21      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) =    0.21      SUBAREA RUNOFF(CFS) =    0.15
EFFECTIVE AREA(ACRES) =      9.86   AREA-AVERAGED Fm(INCH/HR) =  0.50
AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =          9.9       PEAK FLOW RATE(CFS) =       7.12
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =          9.9  TC(MIN.) =     13.35
EFFECTIVE AREA(ACRES) =      9.86  AREA-AVERAGED Fm(INCH/HR)=  0.50
AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.000
PEAK FLOW RATE(CFS)   =          7.12
================================================================================
================================================================================
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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                          Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY ***************************
 * RMV PA-3 WATERSHED 7 EXISTING CONDITION                                *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 5-YR EV MARCH 2019 CCHIU                                               *
 *************************************************************************

  FILE NAME: X30705EV.DAT
  TIME/DATE OF STUDY: 11:09 03/26/2019
========================================================================
   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  60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
 GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth =  0.00 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  30700.00 TO NODE  30701.00 IS CODE =  21
------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  325.00
  ELEVATION DATA: UPSTREAM(FEET) =   760.00  DOWNSTREAM(FEET) =    600.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.225
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.748
  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
  "CHAPARRAL,BROADLEAF"     -        1.30     0.50     1.000     0   8.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.46
  TOTAL AREA(ACRES) =       1.30   PEAK FLOW RATE(CFS) =       1.46


********************************************************************************
  FLOW PROCESS FROM NODE  30701.00 TO NODE  30702.00 IS CODE =  51
------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   600.00  DOWNSTREAM(FEET) =    545.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   378.00   CHANNEL SLOPE = 0.1455
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.575
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
     LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        2.43     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) =       2.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.89
  AVERAGE FLOW DEPTH(FEET) =  0.42   TRAVEL TIME(MIN.) =   1.29
  Tc(MIN.) =    9.51
  SUBAREA AREA(ACRES) =    2.43      SUBAREA RUNOFF(CFS) =   2.35
  EFFECTIVE AREA(ACRES) =      3.74     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.7         PEAK FLOW RATE(CFS) =       3.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.48   FLOW VELOCITY(FEET/SEC.) =   5.28
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30702.00 =     703.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  30702.00 TO NODE  30703.00 IS CODE =  51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =     539.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   71.00   CHANNEL SLOPE =  0.0845
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.541
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE          GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        2.09      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) =       4.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.60
  AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   0.26
  Tc(MIN.) =    9.77
  SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =    1.96
  EFFECTIVE AREA(ACRES) =     5.83      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) =       5.46

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.62   FLOW VELOCITY(FEET/SEC.) =   4.81
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30703.00 =     774.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  30703.00 TO NODE  30704.00 IS CODE =  51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    539.00  DOWNSTREAM(FEET) =     509.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  317.00   CHANNEL SLOPE =  0.0946
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.461
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE          GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        2.46      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) =       6.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.21
  AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   1.01
  Tc(MIN.) =   10.78
  SUBAREA AREA(ACRES) =    2.46      SUBAREA RUNOFF(CFS) =    2.13
  EFFECTIVE AREA(ACRES) =     8.29      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        8.3         PEAK FLOW RATE(CFS) =       7.17
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.67   FLOW VELOCITY(FEET/SEC.) =   5.35
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30704.00 =    1091.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30704.00 TO NODE  30705.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    509.00  DOWNSTREAM(FEET) =     484.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  294.00   CHANNEL SLOPE =  0.0850
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.405
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE          GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        2.96      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) =       8.38
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.36
  AVERAGE FLOW DEPTH(FEET) =   0.72   TRAVEL TIME(MIN.) =   0.91
  Tc(MIN.) =   11.70
  SUBAREA AREA(ACRES) =    2.96      SUBAREA RUNOFF(CFS) =    2.41
  EFFECTIVE AREA(ACRES) =    11.25      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) =       9.16

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.75   FLOW VELOCITY(FEET/SEC.) =   5.42
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30705.00 =    1385.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30705.00 TO NODE  30706.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    484.00  DOWNSTREAM(FEET) =     464.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  257.00   CHANNEL SLOPE =  0.0778
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.357
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE          GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        7.40      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) =      12.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.62
  AVERAGE FLOW DEPTH(FEET) =   0.84   TRAVEL TIME(MIN.) =   0.76
  Tc(MIN.) =   12.46
  SUBAREA AREA(ACRES) =    7.40      SUBAREA RUNOFF(CFS) =    5.71
  EFFECTIVE AREA(ACRES) =    18.66      AREA-AVERAGED Fm(INCH/HR) =   0.50
```

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   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        18.7       PEAK FLOW RATE(CFS) =       14.39

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.90   FLOW VELOCITY(FEET/SEC.) =   5.88
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30706.00 =    1642.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30706.00 TO NODE  30707.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    464.00  DOWNSTREAM(FEET) =    455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   147.00   CHANNEL SLOPE = 0.0612
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.330
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        7.29     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) =       17.12
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.59
   AVERAGE FLOW DEPTH(FEET) =   1.01   TRAVEL TIME(MIN.) =   0.44
   Tc(MIN.) =   12.90
   SUBAREA AREA(ACRES) =       7.29       SUBAREA RUNOFF(CFS) =      5.44
   EFFECTIVE AREA(ACRES) =      25.94      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        25.9       PEAK FLOW RATE(CFS) =       19.38

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.06   FLOW VELOCITY(FEET/SEC.) =   5.80
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30707.00 =    1789.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30707.00 TO NODE  30708.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    432.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   461.00   CHANNEL SLOPE = 0.0499
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.243
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        5.94     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) =       21.37
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.48
   AVERAGE FLOW DEPTH(FEET) =   1.14   TRAVEL TIME(MIN.) =   1.40
   Tc(MIN.) =   14.30
```

```
   SUBAREA AREA(ACRES) =        5.94       SUBAREA RUNOFF(CFS) =      3.98
   EFFECTIVE AREA(ACRES) =      31.89      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        31.9       PEAK FLOW RATE(CFS) =       21.33

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.14   FLOW VELOCITY(FEET/SEC.) =   5.47
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30708.00 =    2250.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  30708.00 TO NODE  30709.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    432.00  DOWNSTREAM(FEET) =    422.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE = 0.0588
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.215
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       13.07     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) =       25.53
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.12
   AVERAGE FLOW DEPTH(FEET) =   1.18   TRAVEL TIME(MIN.) =   0.46
   Tc(MIN.) =   14.76
   SUBAREA AREA(ACRES) =       13.07       SUBAREA RUNOFF(CFS) =      8.40
   EFFECTIVE AREA(ACRES) =      44.95      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        45.0       PEAK FLOW RATE(CFS) =       28.91

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.23   FLOW VELOCITY(FEET/SEC.) =   6.34
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30709.00 =    2420.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  30709.00 TO NODE  30710.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    422.00  DOWNSTREAM(FEET) =    377.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1074.00   CHANNEL SLOPE = 0.0419
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.097
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       19.46     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) =       34.15
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.80
```

```
  AVERAGE FLOW DEPTH(FEET) =   1.40   TRAVEL TIME(MIN.) =   3.09
  Tc(MIN.) =   17.85
  SUBAREA AREA(ACRES) =    19.46       SUBAREA RUNOFF(CFS) =   10.46
  EFFECTIVE AREA(ACRES) =     64.41     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       64.4          PEAK FLOW RATE(CFS) =      34.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.41   FLOW VELOCITY(FEET/SEC.) =   5.82
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30710.00 =   3494.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  30710.00 TO NODE  30711.00 IS CODE =  51
  --------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    377.00  DOWNSTREAM(FEET) =    345.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   546.00   CHANNEL SLOPE =  0.0586
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *   5 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               -         9.60     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) =     37.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.32
  AVERAGE FLOW DEPTH(FEET) =   1.22   TRAVEL TIME(MIN.) =   1.09
  Tc(MIN.) =   18.94
  SUBAREA AREA(ACRES) =     9.60       SUBAREA RUNOFF(CFS) =    4.82
  EFFECTIVE AREA(ACRES) =     74.01     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       74.0          PEAK FLOW RATE(CFS) =      37.16

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.22   FLOW VELOCITY(FEET/SEC.) =   8.35
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30711.00 =   4040.00 FEET.
  ==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        74.0  TC(MIN.) =     18.94
  EFFECTIVE AREA(ACRES) =     74.01  AREA-AVERAGED Fm(INCH/HR)=  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.000
  PEAK FLOW RATE(CFS)   =        37.16
  ==========================================================================
  ==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                       Michael Baker International
                     5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 8 EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 5-YR EV MARCH 2019 CCHIU                                              *
 ************************************************************************

  FILE NAME: X30805EV.DAT
  TIME/DATE OF STUDY: 13:13 03/25/2019
================================================================================
   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  60.0     30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30800.00 TO NODE  30801.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   324.00
  ELEVATION DATA: UPSTREAM(FEET) =    646.00  DOWNSTREAM(FEET) =    573.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.604
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.563
  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
  "CHAPARRAL,BROADLEAF"       -       0.69     0.50     1.000     0   9.60
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.66
  TOTAL AREA(ACRES) =        0.69   PEAK FLOW RATE(CFS) =       0.66

********************************************************************************
  FLOW PROCESS FROM NODE  30801.00 TO NODE  30802.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    573.00  DOWNSTREAM(FEET) =    538.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   104.00   CHANNEL SLOPE = 0.3365
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.521
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE              GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -       1.06     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) =       1.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.47
  AVERAGE FLOW DEPTH(FEET) =  0.26   TRAVEL TIME(MIN.) =   0.32
  Tc(MIN.) =    9.92
  SUBAREA AREA(ACRES) =    1.06       SUBAREA RUNOFF(CFS) =    0.98
  EFFECTIVE AREA(ACRES) =     1.75     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       1.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =   5.86
    LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30802.00 =    428.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  30802.00 TO NODE  30803.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    538.00  DOWNSTREAM(FEET) =    500.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE = 0.2289
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.485
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         1.89      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) =        2.45
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.69
   AVERAGE FLOW DEPTH(FEET) =   0.38    TRAVEL TIME(MIN.) =   0.49
   Tc(MIN.) =   10.41
   SUBAREA AREA(ACRES) =     1.89      SUBAREA RUNOFF(CFS) =    1.68
   EFFECTIVE AREA(ACRES) =     3.64     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) =       3.23

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   6.03
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30803.00 =    594.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  30803.00 TO NODE  30804.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    447.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   284.00   CHANNEL SLOPE = 0.1866
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.438
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         3.78      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) =        4.82
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.22
   AVERAGE FLOW DEPTH(FEET) =   0.51    TRAVEL TIME(MIN.) =   0.76
   Tc(MIN.) =   11.17
   SUBAREA AREA(ACRES) =     3.78      SUBAREA RUNOFF(CFS) =    3.19
   EFFECTIVE AREA(ACRES) =     7.43     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      7.4         PEAK FLOW RATE(CFS) =       6.26
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.56   FLOW VELOCITY(FEET/SEC.) =   6.62
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30804.00 =    878.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30804.00 TO NODE  30805.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =    438.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   101.00   CHANNEL SLOPE = 0.0891
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.418
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         4.22      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) =        8.01
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.35
   AVERAGE FLOW DEPTH(FEET) =   0.71    TRAVEL TIME(MIN.) =   0.31
   Tc(MIN.) =   11.48
   SUBAREA AREA(ACRES) =     4.22      SUBAREA RUNOFF(CFS) =    3.49
   EFFECTIVE AREA(ACRES) =    11.65     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =     11.7         PEAK FLOW RATE(CFS) =       9.62

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.76   FLOW VELOCITY(FEET/SEC.) =   5.58
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30805.00 =    979.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30805.00 TO NODE  30806.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    438.00  DOWNSTREAM(FEET) =    419.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   418.00   CHANNEL SLOPE = 0.0455
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.325
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         7.15      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) =       12.28
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.62
   AVERAGE FLOW DEPTH(FEET) =   0.94    TRAVEL TIME(MIN.) =   1.51
   Tc(MIN.) =   12.99
   SUBAREA AREA(ACRES) =     7.15      SUBAREA RUNOFF(CFS) =    5.31
   EFFECTIVE AREA(ACRES) =    18.80     AREA-AVERAGED Fm(INCH/HR) =   0.50
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   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       18.8       PEAK FLOW RATE(CFS) =      13.95

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.99   FLOW VELOCITY(FEET/SEC.) =  4.77
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30806.00 =   1397.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30806.00 TO NODE  30807.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    419.00  DOWNSTREAM(FEET) =    395.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    499.00   CHANNEL SLOPE = 0.0481
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.224
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        9.75     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) =      17.13
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.12
   AVERAGE FLOW DEPTH(FEET) =  1.06   TRAVEL TIME(MIN.) =  1.62
   Tc(MIN.) =   14.61
   SUBAREA AREA(ACRES) =      9.75       SUBAREA RUNOFF(CFS) =    6.35
   EFFECTIVE AREA(ACRES) =     28.56      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       28.6       PEAK FLOW RATE(CFS) =      18.60

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.09   FLOW VELOCITY(FEET/SEC.) =  5.24
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30807.00 =   1896.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30807.00 TO NODE  30808.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    395.00  DOWNSTREAM(FEET) =    358.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    698.00   CHANNEL SLOPE = 0.0530
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.140
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       10.78     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) =      21.70
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.65
   AVERAGE FLOW DEPTH(FEET) =  1.13   TRAVEL TIME(MIN.) =  2.06
   Tc(MIN.) =   16.68
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   SUBAREA AREA(ACRES) =       10.78       SUBAREA RUNOFF(CFS) =    6.20
   EFFECTIVE AREA(ACRES) =     39.33      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       39.3       PEAK FLOW RATE(CFS) =      22.64

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.15   FLOW VELOCITY(FEET/SEC.) =  5.71
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30808.00 =   2594.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30808.00 TO NODE  30809.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =    332.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    102.00   CHANNEL SLOPE = 0.2549
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.135
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       10.00     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) =      25.49
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 13.15
   AVERAGE FLOW DEPTH(FEET) =  0.80   TRAVEL TIME(MIN.) =  0.13
   Tc(MIN.) =   16.80
   SUBAREA AREA(ACRES) =       10.00       SUBAREA RUNOFF(CFS) =    5.71
   EFFECTIVE AREA(ACRES) =     49.33      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       49.3       PEAK FLOW RATE(CFS) =      28.19

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.83   FLOW VELOCITY(FEET/SEC.) = 13.49
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30809.00 =   2696.00 FEET.
==========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =       49.3  TC(MIN.) =     16.80
   EFFECTIVE AREA(ACRES) =      49.33  AREA-AVERAGED Fm(INCH/HR)=  0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)    =       28.19
==========================================================================
==========================================================================
   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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                    5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 9A EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 5-YR EV MARCH 2019 CCHIU                                             *
 ***********************************************************************

  FILE NAME: X39A05EV.DAT
  TIME/DATE OF STUDY: 12:56 03/25/2019
 ================================================================================
   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  60.0     30.0    0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  2  50.0     25.0    0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  3  40.0     20.0    0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  4  30.0     15.0    0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  5  20.0     10.0    0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
```

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```
  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  30900.00 TO NODE  30901.00 IS CODE =  21
 -------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ================================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
   ELEVATION DATA: UPSTREAM(FEET) =    558.00  DOWNSTREAM(FEET) =     510.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.464
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.481
   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"               -       0.60     0.50     1.000    0  10.46
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =       0.53
   TOTAL AREA(ACRES) =       0.60   PEAK FLOW RATE(CFS) =       0.53


 *******************************************************************************
   FLOW PROCESS FROM NODE  30901.00 TO NODE  30902.00 IS CODE =  51
 -------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    510.00  DOWNSTREAM(FEET) =    470.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   107.00   CHANNEL SLOPE = 0.3738
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.460
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap    SCS
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
   USER-DEFINED               -       1.02     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) =       0.97
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.30
   AVERAGE FLOW DEPTH(FEET) =  0.25    TRAVEL TIME(MIN.) =   0.34
   Tc(MIN.) =   10.80
   SUBAREA AREA(ACRES) =    1.02       SUBAREA RUNOFF(CFS) =    0.88
   EFFECTIVE AREA(ACRES) =     1.62      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       1.6          PEAK FLOW RATE(CFS) =       1.40

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

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```
    DEPTH(FEET) =  0.28    FLOW VELOCITY(FEET/SEC.) =    5.98
    LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30902.00 =     432.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  30902.00 TO NODE  30903.00 IS CODE = 51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    445.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   126.00   CHANNEL SLOPE = 0.1984
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.435
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED             -         1.53      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) =       2.04
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.16
   AVERAGE FLOW DEPTH(FEET) =   0.36    TRAVEL TIME(MIN.) =   0.41
   Tc(MIN.) =   11.21
   SUBAREA AREA(ACRES) =     1.53       SUBAREA RUNOFF(CFS) =    1.29
   EFFECTIVE AREA(ACRES) =     3.15      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) =       2.65

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.40    FLOW VELOCITY(FEET/SEC.) =   5.48
   LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30903.00 =     558.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  30903.00 TO NODE  30904.00 IS CODE = 51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    445.00  DOWNSTREAM(FEET) =    404.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   252.00   CHANNEL SLOPE = 0.1627
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.388
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED             -         3.07      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) =       3.88
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.53
   AVERAGE FLOW DEPTH(FEET) =   0.48    TRAVEL TIME(MIN.) =   0.76
   Tc(MIN.) =   11.97
   SUBAREA AREA(ACRES) =     3.07       SUBAREA RUNOFF(CFS) =    2.45
   EFFECTIVE AREA(ACRES) =     6.22      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        6.2        PEAK FLOW RATE(CFS) =       4.97

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.53    FLOW VELOCITY(FEET/SEC.) =   5.91
   LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30904.00 =     810.00 FEET.


**************************************************************************
   FLOW PROCESS FROM NODE  30904.00 TO NODE  30905.00 IS CODE = 51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    404.00  DOWNSTREAM(FEET) =    356.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   544.00   CHANNEL SLOPE = 0.0882
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.278
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED             -         4.76      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) =       6.63
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.09
   AVERAGE FLOW DEPTH(FEET) =   0.66    TRAVEL TIME(MIN.) =   1.78
   Tc(MIN.) =   13.75
   SUBAREA AREA(ACRES) =     4.76       SUBAREA RUNOFF(CFS) =    3.33
   EFFECTIVE AREA(ACRES) =    10.98      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       11.0        PEAK FLOW RATE(CFS) =       7.68

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.70    FLOW VELOCITY(FEET/SEC.) =   5.27
   LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30905.00 =    1354.00 FEET.


**************************************************************************
   FLOW PROCESS FROM NODE  30905.00 TO NODE  30906.00 IS CODE = 51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    356.00  DOWNSTREAM(FEET) =    332.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   335.00   CHANNEL SLOPE = 0.0716
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.214
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED             -        12.78      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) =      11.79
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.42
   AVERAGE FLOW DEPTH(FEET) =   0.85    TRAVEL TIME(MIN.) =   1.03
   Tc(MIN.) =   14.78
   SUBAREA AREA(ACRES) =    12.78       SUBAREA RUNOFF(CFS) =    8.21
   EFFECTIVE AREA(ACRES) =    23.76      AREA-AVERAGED Fm(INCH/HR) =   0.50
```

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   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         23.8        PEAK FLOW RATE(CFS) =       15.26


   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.94   FLOW VELOCITY(FEET/SEC.) =   5.81
   LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30906.00 =    1689.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE  30906.00 TO NODE  30907.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     332.00  DOWNSTREAM(FEET) =     305.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    447.00   CHANNEL SLOPE = 0.0604
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.170
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        7.40     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) =     17.49
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.00
   AVERAGE FLOW DEPTH(FEET) =   0.91   TRAVEL TIME(MIN.) =   1.06
   Tc(MIN.) =   15.84
   SUBAREA AREA(ACRES) =      7.40       SUBAREA RUNOFF(CFS) =    4.46
   EFFECTIVE AREA(ACRES) =      31.16     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         31.2        PEAK FLOW RATE(CFS) =       18.77


   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.94   FLOW VELOCITY(FEET/SEC.) =   7.06
   LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30907.00 =    2136.00 FEET.
===============================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =        31.2  TC(MIN.) =     15.84
   EFFECTIVE AREA(ACRES) =      31.16  AREA-AVERAGED Fm(INCH/HR)=  0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)    =        18.77
===============================================================================
===============================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                       Analysis prepared by:

                    Michael Baker International
                   5 Hutton Centre Drive Suite 500
                       Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 9B EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 5-YR EV MARCH 2019 CCHIU                                             *
 ************************************************************************

  FILE NAME: X39B05EV.DAT
  TIME/DATE OF STUDY: 12:58 03/25/2019
==================================================================
  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  60.0    30.0      0.020/0.020/0.020 0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020 0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020 0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020 0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020 0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30910.00 TO NODE  30911.00 IS CODE =  21
 --------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
  ELEVATION DATA: UPSTREAM(FEET) =    479.00  DOWNSTREAM(FEET) =    428.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.414
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.484
  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
  "GRASS"                   -       0.34     0.50     1.000    0   10.41
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =       0.34   PEAK FLOW RATE(CFS) =      0.30


****************************************************************************
  FLOW PROCESS FROM NODE  30911.00 TO NODE  30912.00 IS CODE =  51
 --------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    428.00  DOWNSTREAM(FEET) =    380.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    91.00   CHANNEL SLOPE = 0.5275
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.467
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
  USER-DEFINED               -       0.87     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) =      0.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.57
  AVERAGE FLOW DEPTH(FEET) =  0.20    TRAVEL TIME(MIN.) =   0.27
  Tc(MIN.) =   10.69
  SUBAREA AREA(ACRES) =     0.87      SUBAREA RUNOFF(CFS) =    0.75
  EFFECTIVE AREA(ACRES) =     1.20      AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       1.2        PEAK FLOW RATE(CFS) =      1.05

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   6.40
    LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30912.00 =    420.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30912.00 TO NODE  30913.00 IS CODE = 51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    380.00  DOWNSTREAM(FEET) =    372.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   91.00   CHANNEL SLOPE =  0.0879
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.440
   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     -
   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) =      1.39
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.40
   AVERAGE FLOW DEPTH(FEET) =  0.37   TRAVEL TIME(MIN.) =  0.45
   Tc(MIN.) =  11.13
   SUBAREA AREA(ACRES) =     0.80      SUBAREA RUNOFF(CFS) =    0.68
   EFFECTIVE AREA(ACRES) =     2.01     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        2.0        PEAK FLOW RATE(CFS) =      1.70

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   3.65
   LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30913.00 =    511.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30913.00 TO NODE  30914.00 IS CODE = 51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =    355.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  111.00   CHANNEL SLOPE =  0.1532
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.416
   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     -
   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) =      2.24
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.80
   AVERAGE FLOW DEPTH(FEET) =  0.39   TRAVEL TIME(MIN.) =  0.39
   Tc(MIN.) =  11.52
   SUBAREA AREA(ACRES) =     1.30      SUBAREA RUNOFF(CFS) =    1.07
   EFFECTIVE AREA(ACRES) =     3.31     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        3.3        PEAK FLOW RATE(CFS) =      2.73
```

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   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   5.05
   LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30914.00 =    622.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  30914.00 TO NODE  30915.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    340.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  236.00   CHANNEL SLOPE =  0.0636
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.352
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         1.86      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) =      3.44
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.84
   AVERAGE FLOW DEPTH(FEET) =  0.55   TRAVEL TIME(MIN.) =  1.02
   Tc(MIN.) =  12.54
   SUBAREA AREA(ACRES) =     1.86      SUBAREA RUNOFF(CFS) =    1.42
   EFFECTIVE AREA(ACRES) =     5.17     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        5.2        PEAK FLOW RATE(CFS) =      3.96

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   3.97
   LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30915.00 =    858.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  30915.00 TO NODE  30916.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    340.00  DOWNSTREAM(FEET) =    317.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  366.00   CHANNEL SLOPE =  0.0628
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.261
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         2.39      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) =      4.78
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.13
   AVERAGE FLOW DEPTH(FEET) =  0.62   TRAVEL TIME(MIN.) =  1.48
   Tc(MIN.) =  14.02
   SUBAREA AREA(ACRES) =     2.39      SUBAREA RUNOFF(CFS) =    1.63
   EFFECTIVE AREA(ACRES) =     7.56     AREA-AVERAGED Fm(INCH/HR) =   0.50
```

```
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        7.6       PEAK FLOW RATE(CFS) =        5.17


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.64   FLOW VELOCITY(FEET/SEC.) =   4.24
 LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30916.00 =    1224.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  30916.00 TO NODE  30917.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    317.00  DOWNSTREAM(FEET) =    295.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   346.00   CHANNEL SLOPE = 0.0636
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   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               -        4.70      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) =      6.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.52
  AVERAGE FLOW DEPTH(FEET) =   0.70   TRAVEL TIME(MIN.) =   1.27
  Tc(MIN.) =   15.29
  SUBAREA AREA(ACRES) =      4.70        SUBAREA RUNOFF(CFS) =    2.92
  EFFECTIVE AREA(ACRES) =     12.26     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       12.3        PEAK FLOW RATE(CFS) =        7.60


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.74   FLOW VELOCITY(FEET/SEC.) =   4.66
  LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30917.00 =    1570.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       12.3   TC(MIN.) =    15.29
  EFFECTIVE AREA(ACRES)  =      12.26   AREA-AVERAGED Fm(INCH/HR)=  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =        7.60
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                     Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


  *************************** DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 10 EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 5-YR EV MARCH 2019 CCHIU                                               *
 ***************************************************************************

  FILE NAME: X31005EV.DAT
  TIME/DATE OF STUDY: 13:15 03/25/2019
================================================================================
  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  60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31000.00 TO NODE  31001.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
  ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM(FEET) =    455.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.457
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.583
  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
  "GRASS"                  -         0.99      0.50      1.000     0   9.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.96
  TOTAL AREA(ACRES) =       0.99   PEAK FLOW RATE(CFS) =       0.96


****************************************************************************
  FLOW PROCESS FROM NODE  31001.00 TO NODE  31002.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    430.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   222.00   CHANNEL SLOPE = 0.1126
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   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              -         1.27      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) =        1.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.86
  AVERAGE FLOW DEPTH(FEET) =  0.36    TRAVEL TIME(MIN.) =   0.96
  Tc(MIN.) =   10.42
  SUBAREA AREA(ACRES) =    1.27        SUBAREA RUNOFF(CFS) =    1.13
  EFFECTIVE AREA(ACRES) =     2.26      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       2.3         PEAK FLOW RATE(CFS) =      2.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =   4.15
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31002.00 =    542.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31002.00 TO NODE  31003.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    430.00  DOWNSTREAM(FEET) =     422.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  159.00   CHANNEL SLOPE = 0.0503
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.434
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -          1.34     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) =      2.57
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.24
   AVERAGE FLOW DEPTH(FEET) =  0.51   TRAVEL TIME(MIN.) =   0.82
   Tc(MIN.) =   11.23
   SUBAREA AREA(ACRES) =    1.34      SUBAREA RUNOFF(CFS) =    1.13
   EFFECTIVE AREA(ACRES) =    3.61    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) =       3.03

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   3.38
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31003.00 =    701.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31003.00 TO NODE  31004.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    422.00  DOWNSTREAM(FEET) =     379.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  506.00   CHANNEL SLOPE = 0.0850
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.339
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -          2.88     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) =      4.11
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.51
   AVERAGE FLOW DEPTH(FEET) =  0.50   TRAVEL TIME(MIN.) =   1.53
   Tc(MIN.) =   12.76
   SUBAREA AREA(ACRES) =    2.88      SUBAREA RUNOFF(CFS) =    2.17
   EFFECTIVE AREA(ACRES) =    6.48    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) =       4.89
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.53   FLOW VELOCITY(FEET/SEC.) =   5.78
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31004.00 =   1207.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31004.00 TO NODE  31005.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =    365.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  357.00   CHANNEL SLOPE = 0.0392
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.257
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -          2.59     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) =      5.77
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.51
   AVERAGE FLOW DEPTH(FEET) =  0.65   TRAVEL TIME(MIN.) =   1.32
   Tc(MIN.) =   14.08
   SUBAREA AREA(ACRES) =    2.59      SUBAREA RUNOFF(CFS) =    1.76
   EFFECTIVE AREA(ACRES) =    9.07    AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       9.1        PEAK FLOW RATE(CFS) =       6.18

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.67   FLOW VELOCITY(FEET/SEC.) =   4.61
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31005.00 =   1564.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31005.00 TO NODE  31006.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    365.00  DOWNSTREAM(FEET) =    334.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  696.00   CHANNEL SLOPE = 0.0445
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.151
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -          5.86     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) =      7.90
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.08
   AVERAGE FLOW DEPTH(FEET) =  0.72   TRAVEL TIME(MIN.) =   2.28
   Tc(MIN.) =   16.37
   SUBAREA AREA(ACRES) =    5.86      SUBAREA RUNOFF(CFS) =    3.43
   EFFECTIVE AREA(ACRES) =   14.93    AREA-AVERAGED Fm(INCH/HR) =   0.50
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        14.9        PEAK FLOW RATE(CFS) =       8.74


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.74  FLOW VELOCITY(FEET/SEC.) =   5.25
 LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31006.00 =   2260.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE  31006.00 TO NODE  31007.00 IS CODE =  51
-----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =      334.00  DOWNSTREAM(FEET) =      327.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   175.00   CHANNEL SLOPE = 0.0400
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.134
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        33.75     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) =     18.36
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.07
 AVERAGE FLOW DEPTH(FEET) =  1.00   TRAVEL TIME(MIN.) =   0.48
 Tc(MIN.) =  16.85
 SUBAREA AREA(ACRES) =    33.75        SUBAREA RUNOFF(CFS) =  19.24
 EFFECTIVE AREA(ACRES) =     48.68     AREA-AVERAGED Fm(INCH/HR) =   0.50
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        48.7        PEAK FLOW RATE(CFS) =      27.75


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.17  FLOW VELOCITY(FEET/SEC.) =   6.73
 LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31007.00 =   2435.00 FEET.
=============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        48.7  TC(MIN.) =     16.85
 EFFECTIVE AREA(ACRES) =     48.68  AREA-AVERAGED Fm(INCH/HR)=  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       27.75
=============================================================================
=============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

                       Michael Baker International
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                          Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 11 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 5-YR EV MARCH 2019 CCHIU                                              *
 ************************************************************************

  FILE NAME: X31105EV.DAT
  TIME/DATE OF STUDY: 13:18 03/25/2019
================================================================================
   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   60.0    30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
 GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth =  0.00 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  31100.00 TO NODE  31101.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
  ELEVATION DATA: UPSTREAM(FEET) =    532.00  DOWNSTREAM(FEET) =    475.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.054
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.507
  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"               -        0.34      0.50      1.000     0  10.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.31
  TOTAL AREA(ACRES) =       0.34   PEAK FLOW RATE(CFS) =       0.31


********************************************************************************
  FLOW PROCESS FROM NODE  31101.00 TO NODE  31102.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    475.00  DOWNSTREAM(FEET) =    455.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   133.00   CHANNEL SLOPE = 0.1504
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.464
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap    SCS
      LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.47      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) =        0.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.21
  AVERAGE FLOW DEPTH(FEET) =  0.23    TRAVEL TIME(MIN.) =   0.69
  Tc(MIN.) =   10.74
  SUBAREA AREA(ACRES) =    0.47       SUBAREA RUNOFF(CFS) =    0.41
  EFFECTIVE AREA(ACRES) =       0.82      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         0.8         PEAK FLOW RATE(CFS) =       0.71

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.26    FLOW VELOCITY(FEET/SEC.) =   3.60
   LONGEST FLOWPATH FROM NODE 31100.00 TO NODE 31102.00 =    455.00 FEET.


**********************************************************************
  FLOW PROCESS FROM NODE  31102.00 TO NODE  31103.00 IS CODE = 51
----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =     415.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   238.00   CHANNEL SLOPE =  0.1681
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.403
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        0.58      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) =        0.95
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.04
  AVERAGE FLOW DEPTH(FEET) =  0.28    TRAVEL TIME(MIN.) =   0.98
  Tc(MIN.) =   11.73
  SUBAREA AREA(ACRES) =     0.58       SUBAREA RUNOFF(CFS) =    0.47
  EFFECTIVE AREA(ACRES) =      1.40    AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       1.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.30    FLOW VELOCITY(FEET/SEC.) =   4.15
  LONGEST FLOWPATH FROM NODE 31100.00 TO NODE 31103.00 =    693.00 FEET.


**********************************************************************
  FLOW PROCESS FROM NODE  31103.00 TO NODE  31104.00 IS CODE = 51
----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    415.00  DOWNSTREAM(FEET) =     379.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   394.00   CHANNEL SLOPE =  0.0914
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.314
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        1.61      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) =        1.73
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.55
  AVERAGE FLOW DEPTH(FEET) =  0.36    TRAVEL TIME(MIN.) =   1.44
  Tc(MIN.) =   13.17
  SUBAREA AREA(ACRES) =     1.61       SUBAREA RUNOFF(CFS) =    1.18
  EFFECTIVE AREA(ACRES) =      3.01    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) =       2.21
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.39    FLOW VELOCITY(FEET/SEC.) =   4.79
  LONGEST FLOWPATH FROM NODE 31100.00 TO NODE 31104.00 =   1087.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31104.00 TO NODE  31105.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =     359.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0515
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.225
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        5.30      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) =        3.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.52
  AVERAGE FLOW DEPTH(FEET) =  0.54    TRAVEL TIME(MIN.) =   1.43
  Tc(MIN.) =   14.60
  SUBAREA AREA(ACRES) =     5.30       SUBAREA RUNOFF(CFS) =    3.45
  EFFECTIVE AREA(ACRES) =      8.31    AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.3         PEAK FLOW RATE(CFS) =       5.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.61    FLOW VELOCITY(FEET/SEC.) =   4.89
  LONGEST FLOWPATH FROM NODE 31100.00 TO NODE 31105.00 =   1475.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31105.00 TO NODE  31106.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    359.00  DOWNSTREAM(FEET) =     345.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   316.00   CHANNEL SLOPE =  0.0443
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   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              -        2.41      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) =        6.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.81
  AVERAGE FLOW DEPTH(FEET) =  0.65    TRAVEL TIME(MIN.) =   1.10
  Tc(MIN.) =   15.69
  SUBAREA AREA(ACRES) =     2.41       SUBAREA RUNOFF(CFS) =    1.47
  EFFECTIVE AREA(ACRES) =     10.72    AREA-AVERAGED Fm(INCH/HR) =   0.50
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.7       PEAK FLOW RATE(CFS) =       6.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.67   FLOW VELOCITY(FEET/SEC.) =   4.86
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31106.00 =    1791.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  31106.00 TO NODE  31107.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     345.00  DOWNSTREAM(FEET) =     336.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =     340.00   CHANNEL SLOPE = 0.0265
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.129
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       11.64     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) =      9.81
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.43
  AVERAGE FLOW DEPTH(FEET) =   0.86   TRAVEL TIME(MIN.) =   1.28
  Tc(MIN.) =   16.97
  SUBAREA AREA(ACRES) =      11.64      SUBAREA RUNOFF(CFS) =      6.58
  EFFECTIVE AREA(ACRES) =      22.36     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       22.4       PEAK FLOW RATE(CFS) =      12.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.94   FLOW VELOCITY(FEET/SEC.) =   4.74
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31107.00 =    2131.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  31107.00 TO NODE  31108.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     336.00  DOWNSTREAM(FEET) =     325.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =     488.00   CHANNEL SLOPE = 0.0225
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.065
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        5.13     0.50     0.939     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.939
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     14.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.57
  AVERAGE FLOW DEPTH(FEET) =   1.01   TRAVEL TIME(MIN.) =   1.78
  Tc(MIN.) =   18.76
```

```
  SUBAREA AREA(ACRES) =       5.13      SUBAREA RUNOFF(CFS) =      2.75
  EFFECTIVE AREA(ACRES) =      27.49     AREA-AVERAGED Fm(INCH/HR) =   0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =       27.5       PEAK FLOW RATE(CFS) =      14.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.02   FLOW VELOCITY(FEET/SEC.) =   4.54
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31108.00 =    2619.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  31108.00 TO NODE  31109.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     325.00  DOWNSTREAM(FEET) =     275.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =     731.00   CHANNEL SLOPE = 0.0684
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.000
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       10.26     0.50     0.934     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.934
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.82
  AVERAGE FLOW DEPTH(FEET) =   0.97   TRAVEL TIME(MIN.) =   2.09
  Tc(MIN.) =   20.85
  SUBAREA AREA(ACRES) =      10.26      SUBAREA RUNOFF(CFS) =      4.92
  EFFECTIVE AREA(ACRES) =      37.75     AREA-AVERAGED Fm(INCH/HR) =   0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =       37.7       PEAK FLOW RATE(CFS) =      17.41

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.99   FLOW VELOCITY(FEET/SEC.) =   5.87
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31109.00 =    3350.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  31109.00 TO NODE  31110.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     275.00  DOWNSTREAM(FEET) =     261.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =     641.00   CHANNEL SLOPE = 0.0218
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 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              -       15.10     0.50     0.985     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.985
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.98
```

```
  AVERAGE FLOW DEPTH(FEET) =    1.31    TRAVEL TIME(MIN.) =    2.68
  Tc(MIN.) =   23.53
  SUBAREA AREA(ACRES) =    15.10        SUBAREA RUNOFF(CFS) =     6.01
  EFFECTIVE AREA(ACRES) =      52.85      AREA-AVERAGED Fm(INCH/HR) =    0.49
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   0.98
  TOTAL AREA(ACRES) =        52.8          PEAK FLOW RATE(CFS) =       21.24

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.32   FLOW VELOCITY(FEET/SEC.) =   4.03
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31110.00 =    3991.00 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =         52.8   TC(MIN.) =      23.53
  EFFECTIVE AREA(ACRES) =      52.85   AREA-AVERAGED Fm(INCH/HR)=   0.49
  AREA-AVERAGED Fp(INCH/HR) =   0.50   AREA-AVERAGED Ap = 0.977
  PEAK FLOW RATE(CFS)    =        21.24
================================================================================
================================================================================
  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 ************************
 * RMV PA-3 WATERSHED 12 EXISTING CONDITION                          *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                             *
 * 5-YR EV MARCH 2019 CCHIU                                          *
 ********************************************************************

  FILE NAME: X31205EV.DAT
  TIME/DATE OF STUDY: 13:25 03/25/2019
===================================================================
  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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth =  0.00 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  31200.00 TO NODE  31201.00 IS CODE =  21
-------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
  ELEVATION DATA: UPSTREAM(FEET) =    761.00  DOWNSTREAM(FEET) =    639.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.619
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.695
  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"            -        0.91     0.50     1.000     0    8.62
  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) =      0.91   PEAK FLOW RATE(CFS) =       0.98


********************************************************************
  FLOW PROCESS FROM NODE  31201.00 TO NODE  31202.00 IS CODE =  51
-------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    639.00  DOWNSTREAM(FEET) =    595.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE = 0.2009
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.593
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
     LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED            -        0.97     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) =       1.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.80
  AVERAGE FLOW DEPTH(FEET) =  0.32    TRAVEL TIME(MIN.) =   0.76
  Tc(MIN.) =    9.38
  SUBAREA AREA(ACRES) =     0.97       SUBAREA RUNOFF(CFS) =    0.95
  EFFECTIVE AREA(ACRES) =      1.88      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       1.9         PEAK FLOW RATE(CFS) =      1.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   5.07
    LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31202.00 =    540.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31202.00 TO NODE  31203.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   595.00  DOWNSTREAM(FEET) =     589.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   50.00   CHANNEL SLOPE =  0.1200
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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               -        2.51      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) =        3.05
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.75
   AVERAGE FLOW DEPTH(FEET) =   0.46   TRAVEL TIME(MIN.) =   0.18
   Tc(MIN.) =    9.55
   SUBAREA AREA(ACRES) =     2.51      SUBAREA RUNOFF(CFS) =    2.42
   EFFECTIVE AREA(ACRES) =     4.38     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        4.4         PEAK FLOW RATE(CFS) =       4.22

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =   5.13
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31203.00 =    590.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31203.00 TO NODE  31204.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   589.00  DOWNSTREAM(FEET) =     560.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   308.00   CHANNEL SLOPE =  0.0942
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.475
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        4.19      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) =        6.06
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.08
   AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   1.01
   Tc(MIN.) =   10.56
   SUBAREA AREA(ACRES) =     4.19      SUBAREA RUNOFF(CFS) =    3.68
   EFFECTIVE AREA(ACRES) =     8.57     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) =       7.52


   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.68   FLOW VELOCITY(FEET/SEC.) =   5.36
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31204.00 =    898.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31204.00 TO NODE  31205.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   560.00  DOWNSTREAM(FEET) =    537.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   457.00   CHANNEL SLOPE =  0.0503
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.373
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        8.19      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) =       10.74
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.62
   AVERAGE FLOW DEPTH(FEET) =   0.88   TRAVEL TIME(MIN.) =   1.65
   Tc(MIN.) =   12.21
   SUBAREA AREA(ACRES) =      8.19      SUBAREA RUNOFF(CFS) =    6.43
   EFFECTIVE AREA(ACRES) =    16.76      AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       16.8         PEAK FLOW RATE(CFS) =      13.17

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.95   FLOW VELOCITY(FEET/SEC.) =   4.87
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31205.00 =   1355.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  31205.00 TO NODE  31206.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   537.00  DOWNSTREAM(FEET) =    479.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   780.00   CHANNEL SLOPE =  0.0744
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.242
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -       15.47      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) =       18.34
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.15
   AVERAGE FLOW DEPTH(FEET) =   1.00   TRAVEL TIME(MIN.) =   2.11
   Tc(MIN.) =   14.32
   SUBAREA AREA(ACRES) =     15.47      SUBAREA RUNOFF(CFS) =   10.33
   EFFECTIVE AREA(ACRES) =    32.24      AREA-AVERAGED Fm(INCH/HR) =  0.50
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   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        32.2        PEAK FLOW RATE(CFS) =       21.52

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.06   FLOW VELOCITY(FEET/SEC.) =   6.41
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31206.00 =   2135.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31206.00 TO NODE  31207.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    479.00  DOWNSTREAM(FEET) =    455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   551.00   CHANNEL SLOPE = 0.0436
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.168
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        37.81     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) =       32.88
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.84
   AVERAGE FLOW DEPTH(FEET) =   1.37   TRAVEL TIME(MIN.) =   1.57
   Tc(MIN.) =   15.90
   SUBAREA AREA(ACRES) =    37.81        SUBAREA RUNOFF(CFS) =   22.71
   EFFECTIVE AREA(ACRES) =     70.05      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        70.1        PEAK FLOW RATE(CFS) =       42.08

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.51   FLOW VELOCITY(FEET/SEC.) =   6.19
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31207.00 =   2686.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31207.00 TO NODE  31208.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    434.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   743.00   CHANNEL SLOPE = 0.0283
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.085
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        18.18     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) =       46.87
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.42
   AVERAGE FLOW DEPTH(FEET) =   1.70   TRAVEL TIME(MIN.) =   2.29
   Tc(MIN.) =   18.18
```

```
   SUBAREA AREA(ACRES) =        18.18        SUBAREA RUNOFF(CFS) =   9.58
   EFFECTIVE AREA(ACRES) =      88.23      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        88.2        PEAK FLOW RATE(CFS) =       46.47

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.70   FLOW VELOCITY(FEET/SEC.) =   5.38
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31208.00 =   3429.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31208.00 TO NODE  31209.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    434.00  DOWNSTREAM(FEET) =    410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   899.00   CHANNEL SLOPE = 0.0267
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.999
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        42.09     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) =       55.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.53
   AVERAGE FLOW DEPTH(FEET) =   1.84   TRAVEL TIME(MIN.) =   2.71
   Tc(MIN.) =   20.89
   SUBAREA AREA(ACRES) =    42.09        SUBAREA RUNOFF(CFS) =   18.88
   EFFECTIVE AREA(ACRES) =    130.32      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       130.3        PEAK FLOW RATE(CFS) =       58.45

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.87   FLOW VELOCITY(FEET/SEC.) =   5.59
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31209.00 =   4328.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31209.00 TO NODE  31210.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    390.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   724.00   CHANNEL SLOPE = 0.0276
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.949
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        27.15     0.50     0.999      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.999
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       63.94
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.79
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  AVERAGE FLOW DEPTH(FEET) =   1.92   TRAVEL TIME(MIN.) =   2.08
  Tc(MIN.) =   22.98
  SUBAREA AREA(ACRES) =     27.15      SUBAREA RUNOFF(CFS) =    10.97
  EFFECTIVE AREA(ACRES) =    157.48     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =     157.5          PEAK FLOW RATE(CFS) =      63.56

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.91   FLOW VELOCITY(FEET/SEC.) =   5.79
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31210.00 =    5052.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31210.00 TO NODE  31211.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     390.00  DOWNSTREAM(FEET) =     364.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1073.00   CHANNEL SLOPE = 0.0242
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.883
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        15.95      0.50      0.963      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.963
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      66.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.57
  AVERAGE FLOW DEPTH(FEET) =   1.99   TRAVEL TIME(MIN.) =   3.21
  Tc(MIN.) =   26.19
  SUBAREA AREA(ACRES) =     15.95      SUBAREA RUNOFF(CFS) =     5.77
  EFFECTIVE AREA(ACRES) =    173.43     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =     173.4          PEAK FLOW RATE(CFS) =      63.56
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.96   FLOW VELOCITY(FEET/SEC.) =   5.49
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31211.00 =    6125.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31211.00 TO NODE  31212.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     364.00  DOWNSTREAM(FEET) =     318.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1175.00   CHANNEL SLOPE = 0.0391
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.844
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        81.12      0.50      0.928      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
```

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  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.928
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      77.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.95
  AVERAGE FLOW DEPTH(FEET) =   1.93   TRAVEL TIME(MIN.) =   2.82
  Tc(MIN.) =   29.01
  SUBAREA AREA(ACRES) =     81.12      SUBAREA RUNOFF(CFS) =    27.72
  EFFECTIVE AREA(ACRES) =    254.55     AREA-AVERAGED Fm(INCH/HR) =   0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   0.97
  TOTAL AREA(ACRES) =     254.5          PEAK FLOW RATE(CFS) =      81.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.97   FLOW VELOCITY(FEET/SEC.) =   7.00
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31212.00 =    7300.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31212.00 TO NODE  31213.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     318.00  DOWNSTREAM(FEET) =     317.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  506.00   CHANNEL SLOPE = 0.0020
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.793
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         1.00      0.50      0.850      -
  USER-DEFINED              -        28.30      0.50      1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.995
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      85.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.32
  AVERAGE FLOW DEPTH(FEET) =   3.51   TRAVEL TIME(MIN.) =   3.64
  Tc(MIN.) =   32.64
  SUBAREA AREA(ACRES) =     29.30      SUBAREA RUNOFF(CFS) =     7.79
  EFFECTIVE AREA(ACRES) =    283.85     AREA-AVERAGED Fm(INCH/HR) =   0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   0.98
  TOTAL AREA(ACRES) =     283.8          PEAK FLOW RATE(CFS) =      81.65
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.45   FLOW VELOCITY(FEET/SEC.) =   2.29
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31213.00 =    7806.00 FEET.
=========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      283.8   TC(MIN.) =      32.64
  EFFECTIVE AREA(ACRES) =     283.85  AREA-AVERAGED Fm(INCH/HR)=  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 0.977
  PEAK FLOW RATE(CFS)   =       81.65
=========================================================================
=========================================================================
  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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                        Analysis prepared by:

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  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 13 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 5-YR EV MARCH 2019 CCHIU                                            *
  *********************************************************************

  FILE NAME: X31305EV.DAT
  TIME/DATE OF STUDY: 13:28 03/25/2019
 ====================================================================
  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  60.0     30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31300.00 TO NODE  31301.00 IS CODE =  21
 --------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
  ELEVATION DATA: UPSTREAM(FEET) =    535.00  DOWNSTREAM(FEET) =    490.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.423
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.484
  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
  "GRASS"                    -       0.53     0.50     1.000    0   10.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =       0.53   PEAK FLOW RATE(CFS) =      0.47


 ****************************************************************************
  FLOW PROCESS FROM NODE  31301.00 TO NODE  31302.00 IS CODE =  51
 --------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    480.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00    CHANNEL SLOPE = 0.0746
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.437
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA     Fp       Ap     SCS
      LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED                -       1.00     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) =       0.89
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.94
  AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   0.76
  Tc(MIN.) =   11.18
  SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    0.84
  EFFECTIVE AREA(ACRES) =     1.53     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       1.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.37   FLOW VELOCITY(FEET/SEC.) =   3.15
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31302.00 =     450.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31302.00 TO NODE  31303.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    480.00  DOWNSTREAM(FEET) =    469.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  237.00   CHANNEL SLOPE = 0.0464
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.353
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         1.63     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) =       1.92
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.91
   AVERAGE FLOW DEPTH(FEET) =   0.47   TRAVEL TIME(MIN.) =   1.36
   Tc(MIN.) =   12.54
   SUBAREA AREA(ACRES) =     1.63       SUBAREA RUNOFF(CFS) =    1.25
   EFFECTIVE AREA(ACRES) =    3.16      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) =     2.43

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   3.13
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31303.00 =     687.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31303.00 TO NODE  31304.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    469.00  DOWNSTREAM(FEET) =    418.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  483.00   CHANNEL SLOPE = 0.1056
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.245
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         3.16     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) =       3.49
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.64
   AVERAGE FLOW DEPTH(FEET) =   0.50   TRAVEL TIME(MIN.) =   1.74
   Tc(MIN.) =   14.27
   SUBAREA AREA(ACRES) =     3.16       SUBAREA RUNOFF(CFS) =    2.12
   EFFECTIVE AREA(ACRES) =    6.32      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       6.3         PEAK FLOW RATE(CFS) =     4.24
```

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   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   4.87
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31304.00 =    1170.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  31304.00 TO NODE  31305.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    418.00  DOWNSTREAM(FEET) =    381.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  469.00   CHANNEL SLOPE = 0.0789
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.170
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        10.56     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) =       7.43
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.98
   AVERAGE FLOW DEPTH(FEET) =   0.70   TRAVEL TIME(MIN.) =   1.57
   Tc(MIN.) =   15.84
   SUBAREA AREA(ACRES) =    10.56       SUBAREA RUNOFF(CFS) =    6.36
   EFFECTIVE AREA(ACRES) =   16.88      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      16.9         PEAK FLOW RATE(CFS) =    10.17

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.79   FLOW VELOCITY(FEET/SEC.) =   5.42
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31305.00 =    1639.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  31305.00 TO NODE  31306.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    381.00  DOWNSTREAM(FEET) =    363.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  398.00   CHANNEL SLOPE = 0.0452
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.130
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        19.15     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) =      15.60
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.07
   AVERAGE FLOW DEPTH(FEET) =   0.93   TRAVEL TIME(MIN.) =   1.09
   Tc(MIN.) =   16.94
   SUBAREA AREA(ACRES) =    19.15       SUBAREA RUNOFF(CFS) =   10.86
   EFFECTIVE AREA(ACRES) =   36.03      AREA-AVERAGED Fm(INCH/HR) =   0.50
```

```
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       36.0        PEAK FLOW RATE(CFS) =       20.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.03   FLOW VELOCITY(FEET/SEC.) =   6.48
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31306.00 =    2037.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31306.00 TO NODE  31307.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     363.00  DOWNSTREAM(FEET) =     313.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =     836.00   CHANNEL SLOPE = 0.0598
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.064
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        13.40     0.50      0.998     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.998
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      23.84
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.53
  AVERAGE FLOW DEPTH(FEET) =   1.03   TRAVEL TIME(MIN.) =   1.85
  Tc(MIN.) =   18.79
  SUBAREA AREA(ACRES) =      13.40       SUBAREA RUNOFF(CFS) =      6.81
  EFFECTIVE AREA(ACRES) =      49.43     AREA-AVERAGED Fm(INCH/HR) =    0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       49.4        PEAK FLOW RATE(CFS) =       25.08

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.05   FLOW VELOCITY(FEET/SEC.) =   7.61
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31307.00 =    2873.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31307.00 TO NODE  31308.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     313.00  DOWNSTREAM(FEET) =     302.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =     763.00   CHANNEL SLOPE = 0.0144
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.982
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        11.99     0.50      0.998     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.998
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      27.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.56
  AVERAGE FLOW DEPTH(FEET) =   1.42   TRAVEL TIME(MIN.) =   2.79
  Tc(MIN.) =   21.57
```

```
  SUBAREA AREA(ACRES) =      11.99       SUBAREA RUNOFF(CFS) =      5.21
  EFFECTIVE AREA(ACRES) =      61.43     AREA-AVERAGED Fm(INCH/HR) =    0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       61.4        PEAK FLOW RATE(CFS) =       26.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.40   FLOW VELOCITY(FEET/SEC.) =   4.53
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31308.00 =    3636.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31308.00 TO NODE  31309.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     302.00  DOWNSTREAM(FEET) =     289.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1009.00   CHANNEL SLOPE = 0.0129
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.896
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        21.83     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) =      30.56
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.49
  AVERAGE FLOW DEPTH(FEET) =   1.51   TRAVEL TIME(MIN.) =   3.74
  Tc(MIN.) =   25.32
  SUBAREA AREA(ACRES) =      21.83       SUBAREA RUNOFF(CFS) =      7.77
  EFFECTIVE AREA(ACRES) =      83.25     AREA-AVERAGED Fm(INCH/HR) =    0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       83.3        PEAK FLOW RATE(CFS) =       29.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.49   FLOW VELOCITY(FEET/SEC.) =   4.45
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31309.00 =    4645.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31309.00 TO NODE  31310.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     289.00  DOWNSTREAM(FEET) =     275.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  628.00   CHANNEL SLOPE = 0.0223
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.870
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        37.10     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) =      35.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.72
```

```
  AVERAGE FLOW DEPTH(FEET) =   1.44   TRAVEL TIME(MIN.) =   1.83
  Tc(MIN.) =   27.15
  SUBAREA AREA(ACRES) =    37.10      SUBAREA RUNOFF(CFS) =   12.35
  EFFECTIVE AREA(ACRES) =    120.35     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       120.4        PEAK FLOW RATE(CFS) =      40.07

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.51   FLOW VELOCITY(FEET/SEC.) =   5.89
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31310.00 =    5273.00 FEET.
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       120.4  TC(MIN.) =     27.15
  EFFECTIVE AREA(ACRES) =    120.35  AREA-AVERAGED Fm(INCH/HR)=  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       40.07
===============================================================================
===============================================================================
  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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          Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                     Analysis prepared by:

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                       Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY ************************
 * RMV PA-3 WATERSHED 14 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 5-YR EV MARCH 2019 CCHIU                                           *
 ********************************************************************

  FILE NAME: X31405EV.DAT
  TIME/DATE OF STUDY: 13:43 03/25/2019
=================================================================
   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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth = 0.00 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  31400.00 TO NODE  31401.00 IS CODE =  21
---------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  327.00
  ELEVATION DATA: UPSTREAM(FEET) =   868.00  DOWNSTREAM(FEET) =    772.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.143
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.625
  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
  "CHAPARRAL,NARROWLEAF"     -         0.99     0.50     1.000     0    9.14
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =       1.00
  TOTAL AREA(ACRES) =       0.99   PEAK FLOW RATE(CFS) =       1.00


**********************************************************************
  FLOW PROCESS FROM NODE  31401.00 TO NODE  31402.00 IS CODE =  51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   772.00  DOWNSTREAM(FEET) =    750.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  134.00   CHANNEL SLOPE = 0.1642
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.559
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
      LAND USE             GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED                -         1.23     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) =      1.58
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.56
  AVERAGE FLOW DEPTH(FEET) =  0.34   TRAVEL TIME(MIN.) =   0.49
  Tc(MIN.) =    9.63
  SUBAREA AREA(ACRES) =    1.23      SUBAREA RUNOFF(CFS) =   1.17
  EFFECTIVE AREA(ACRES) =     2.21     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       2.2         PEAK FLOW RATE(CFS) =       2.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
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```
   DEPTH(FEET) =  0.38   FLOW VELOCITY(FEET/SEC.) =   4.76
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31402.00 =    461.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31402.00 TO NODE  31403.00 IS CODE = 51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   750.00  DOWNSTREAM(FEET) =    710.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE = 0.1258
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -        1.42      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) =     2.73
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.70
   AVERAGE FLOW DEPTH(FEET) =  0.44   TRAVEL TIME(MIN.) =   1.13
   Tc(MIN.) =   10.76
   SUBAREA AREA(ACRES) =    1.42      SUBAREA RUNOFF(CFS) =   1.23
   EFFECTIVE AREA(ACRES) =     3.64     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) =       3.15

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.47   FLOW VELOCITY(FEET/SEC.) =   4.79
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31403.00 =    779.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31403.00 TO NODE  31404.00 IS CODE = 51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   710.00  DOWNSTREAM(FEET) =    688.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   181.00   CHANNEL SLOPE = 0.1215
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.426
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        1.91      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) =     3.95
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.09
   AVERAGE FLOW DEPTH(FEET) =  0.51   TRAVEL TIME(MIN.) =   0.59
   Tc(MIN.) =   11.35
   SUBAREA AREA(ACRES) =    1.91      SUBAREA RUNOFF(CFS) =   1.59
   EFFECTIVE AREA(ACRES) =     5.55     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       5.5         PEAK FLOW RATE(CFS) =       4.62
```

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   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   5.19
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31404.00 =    960.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31404.00 TO NODE  31405.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   688.00  DOWNSTREAM(FEET) =   675.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   237.00   CHANNEL SLOPE = 0.0549
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.366
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        2.67      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) =     5.66
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.06
   AVERAGE FLOW DEPTH(FEET) =  0.68   TRAVEL TIME(MIN.) =   0.97
   Tc(MIN.) =   12.33
   SUBAREA AREA(ACRES) =    2.67      SUBAREA RUNOFF(CFS) =    2.08
   EFFECTIVE AREA(ACRES) =     8.21     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       8.2         PEAK FLOW RATE(CFS) =       6.40

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.71   FLOW VELOCITY(FEET/SEC.) =   4.20
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31405.00 =   1197.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31405.00 TO NODE  31406.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   675.00  DOWNSTREAM(FEET) =   668.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   78.00   CHANNEL SLOPE = 0.0897
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.351
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        7.51      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) =     9.28
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.57
   AVERAGE FLOW DEPTH(FEET) =  0.74   TRAVEL TIME(MIN.) =   0.23
   Tc(MIN.) =   12.56
   SUBAREA AREA(ACRES) =    7.51      SUBAREA RUNOFF(CFS) =    5.76
   EFFECTIVE AREA(ACRES) =    15.73     AREA-AVERAGED Fm(INCH/HR) =   0.50
```

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   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       15.7      PEAK FLOW RATE(CFS) =      12.05

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.82   FLOW VELOCITY(FEET/SEC.) =   5.96
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31406.00 =    1275.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31406.00 TO NODE  31407.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    668.00  DOWNSTREAM(FEET) =    640.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE = 0.0502
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.238
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp       Ap       SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -        9.79     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) =      15.30
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.08
   AVERAGE FLOW DEPTH(FEET) =   1.00   TRAVEL TIME(MIN.) =   1.83
   Tc(MIN.) =   14.39
   SUBAREA AREA(ACRES) =      9.79      SUBAREA RUNOFF(CFS) =      6.50
   EFFECTIVE AREA(ACRES) =      25.52      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       25.5      PEAK FLOW RATE(CFS) =      16.94

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.04   FLOW VELOCITY(FEET/SEC.) =   5.20
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31407.00 =    1833.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31407.00 TO NODE  31408.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    607.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   710.00   CHANNEL SLOPE = 0.0465
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.143
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp       Ap       SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -       18.46     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) =      22.29
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.41
   AVERAGE FLOW DEPTH(FEET) =   1.17   TRAVEL TIME(MIN.) =   2.19
   Tc(MIN.) =   16.58
```

```
   SUBAREA AREA(ACRES) =       18.46      SUBAREA RUNOFF(CFS) =      10.68
   EFFECTIVE AREA(ACRES) =       43.97      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       44.0      PEAK FLOW RATE(CFS) =      25.45

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.23   FLOW VELOCITY(FEET/SEC.) =   5.60
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31408.00 =    2543.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31408.00 TO NODE  31409.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    607.00  DOWNSTREAM(FEET) =    574.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   674.00   CHANNEL SLOPE = 0.0490
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.074
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp       Ap       SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -        9.15     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) =      27.81
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.82
   AVERAGE FLOW DEPTH(FEET) =   1.26   TRAVEL TIME(MIN.) =   1.93
   Tc(MIN.) =   18.51
   SUBAREA AREA(ACRES) =      9.15      SUBAREA RUNOFF(CFS) =      4.72
   EFFECTIVE AREA(ACRES) =       53.13      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       53.1      PEAK FLOW RATE(CFS) =      27.42

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.25   FLOW VELOCITY(FEET/SEC.) =   5.81
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31409.00 =    3217.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31409.00 TO NODE  31410.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =    540.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   817.00   CHANNEL SLOPE = 0.0416
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 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             -       54.88     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) =      39.81
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.02
```

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   AVERAGE FLOW DEPTH(FEET) =   1.48    TRAVEL TIME(MIN.) =    2.26
   Tc(MIN.) =   20.77
   SUBAREA AREA(ACRES) =    54.88      SUBAREA RUNOFF(CFS) =   24.76
   EFFECTIVE AREA(ACRES) =    108.01      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      108.0        PEAK FLOW RATE(CFS) =      48.73

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.61   FLOW VELOCITY(FEET/SEC.) =   6.31
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31410.00 =   4034.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  31410.00 TO NODE  31411.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    500.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1364.00   CHANNEL SLOPE = 0.0293
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.906
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        40.22     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) =     56.09
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.74
   AVERAGE FLOW DEPTH(FEET) =   1.81    TRAVEL TIME(MIN.) =    3.96
   Tc(MIN.) =   24.73
   SUBAREA AREA(ACRES) =    40.22      SUBAREA RUNOFF(CFS) =   14.70
   EFFECTIVE AREA(ACRES) =    148.22      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      148.2        PEAK FLOW RATE(CFS) =      54.19

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.78   FLOW VELOCITY(FEET/SEC.) =   5.69
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31411.00 =   5398.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  31411.00 TO NODE  31412.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    468.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  985.00   CHANNEL SLOPE = 0.0325
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.867
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       100.09     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) =      70.73
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.31
   AVERAGE FLOW DEPTH(FEET) =   1.93    TRAVEL TIME(MIN.) =    2.60
   Tc(MIN.) =   27.34
   SUBAREA AREA(ACRES) =   100.09      SUBAREA RUNOFF(CFS) =   33.07
   EFFECTIVE AREA(ACRES) =    248.31      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      248.3        PEAK FLOW RATE(CFS) =      82.04

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.04   FLOW VELOCITY(FEET/SEC.) =   6.56
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31412.00 =   6383.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  31412.00 TO NODE  31413.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    468.00  DOWNSTREAM(FEET) =    428.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1135.00   CHANNEL SLOPE = 0.0352
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.829
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        56.18     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) =      90.36
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.92
   AVERAGE FLOW DEPTH(FEET) =   2.09    TRAVEL TIME(MIN.) =    2.73
   Tc(MIN.) =   30.07
   SUBAREA AREA(ACRES) =    56.18      SUBAREA RUNOFF(CFS) =   16.63
   EFFECTIVE AREA(ACRES) =    304.49      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      304.5        PEAK FLOW RATE(CFS) =      90.12

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.09   FLOW VELOCITY(FEET/SEC.) =   6.91
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31413.00 =   7518.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  31413.00 TO NODE  31414.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    428.00  DOWNSTREAM(FEET) =    394.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  888.00   CHANNEL SLOPE = 0.0383
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.800
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        35.49     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) =        94.91
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    7.22
AVERAGE FLOW DEPTH(FEET) =    2.09    TRAVEL TIME(MIN.) =    2.05
Tc(MIN.) =   32.12
SUBAREA AREA(ACRES) =     35.49        SUBAREA RUNOFF(CFS) =      9.59
EFFECTIVE AREA(ACRES) =      339.98      AREA-AVERAGED Fm(INCH/HR) =    0.50
AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =        340.0        PEAK FLOW RATE(CFS) =        91.84

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  2.06    FLOW VELOCITY(FEET/SEC.) =   7.18
LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31414.00 =    8406.00 FEET.

*************************************************************************
 FLOW PROCESS FROM NODE  31414.00 TO NODE  31415.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    394.00  DOWNSTREAM(FEET) =     368.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1044.00   CHANNEL SLOPE = 0.0249
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.761
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED               -        26.50     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) =        94.95
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    6.15
 AVERAGE FLOW DEPTH(FEET) =    2.27    TRAVEL TIME(MIN.) =    2.83
 Tc(MIN.) =   34.95
 SUBAREA AREA(ACRES) =     26.50        SUBAREA RUNOFF(CFS) =      6.21
 EFFECTIVE AREA(ACRES) =      366.48      AREA-AVERAGED Fm(INCH/HR) =    0.50
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        366.5        PEAK FLOW RATE(CFS) =        91.84
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.24    FLOW VELOCITY(FEET/SEC.) =   6.10
 LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31415.00 =    9450.00 FEET.

*************************************************************************
 FLOW PROCESS FROM NODE  31415.00 TO NODE  31416.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    368.00  DOWNSTREAM(FEET) =     334.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1318.00   CHANNEL SLOPE = 0.0258
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.712
 SUBAREA LOSS RATE DATA(AMC  II):
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  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED               -        52.53     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) =        96.84
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    6.27
 AVERAGE FLOW DEPTH(FEET) =    2.27    TRAVEL TIME(MIN.) =    3.50
 Tc(MIN.) =   38.45
 SUBAREA AREA(ACRES) =     52.53        SUBAREA RUNOFF(CFS) =     10.00
 EFFECTIVE AREA(ACRES) =      419.00      AREA-AVERAGED Fm(INCH/HR) =    0.50
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        419.0        PEAK FLOW RATE(CFS) =        91.84
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.22    FLOW VELOCITY(FEET/SEC.) =   6.18
 LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31416.00 =   10768.00 FEET.

***********************************************************************************
 FLOW PROCESS FROM NODE  31416.00 TO NODE  31417.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    334.00  DOWNSTREAM(FEET) =     325.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1012.00   CHANNEL SLOPE = 0.0089
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.670
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED               -        16.45     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) =        93.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    4.17
 AVERAGE FLOW DEPTH(FEET) =    2.73    TRAVEL TIME(MIN.) =    4.05
 Tc(MIN.) =   42.50
 SUBAREA AREA(ACRES) =     16.45        SUBAREA RUNOFF(CFS) =      2.51
 EFFECTIVE AREA(ACRES) =      435.46      AREA-AVERAGED Fm(INCH/HR) =    0.50
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        435.5        PEAK FLOW RATE(CFS) =        91.84
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.72    FLOW VELOCITY(FEET/SEC.) =   4.14
 LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31417.00 =   11780.00 FEET.

***********************************************************************************
 FLOW PROCESS FROM NODE  31417.00 TO NODE  31418.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =     301.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1232.00    CHANNEL SLOPE = 0.0195
```

```
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.641
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp        Ap      SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED               -       13.50      0.50      0.694     -
USER-DEFINED               -       32.00      0.50      1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.909
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      95.65
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.61
AVERAGE FLOW DEPTH(FEET) =   2.38   TRAVEL TIME(MIN.) =   3.66
Tc(MIN.) =   46.15
SUBAREA AREA(ACRES) =    45.50       SUBAREA RUNOFF(CFS) =    7.62
EFFECTIVE AREA(ACRES) =    480.96     AREA-AVERAGED Fm(INCH/HR) =   0.50
AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   0.99
TOTAL AREA(ACRES) =      481.0         PEAK FLOW RATE(CFS) =      91.84
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 2.35   FLOW VELOCITY(FEET/SEC.) =   5.57
LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31418.00 =   13012.00 FEET.
===============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =       481.0  TC(MIN.) =     46.15
EFFECTIVE AREA(ACRES) =    480.96  AREA-AVERAGED Fm(INCH/HR)=  0.50
AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 0.991
PEAK FLOW RATE(CFS)   =      91.84
===============================================================================
===============================================================================
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 **************************
 * RMV PA-3 WATERSHED 15 EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 5-YR EV MARCH 2019 CCHIU                                               *
  *************************************************************************

  FILE NAME: X31505EV.DAT
  TIME/DATE OF STUDY: 13:48 03/25/2019
=================================================================================
  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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = 0.00 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  31500.00 TO NODE  31501.00 IS CODE =  21
-------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   326.00
  ELEVATION DATA: UPSTREAM(FEET) =   416.00  DOWNSTREAM(FEET) =    379.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.043
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.445
  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
  "GRASS"                   -       0.66     0.50      1.000     0   11.04
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.56
  TOTAL AREA(ACRES) =       0.66   PEAK FLOW RATE(CFS) =       0.56


*******************************************************************************
  FLOW PROCESS FROM NODE  31501.00 TO NODE  31502.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   379.00  DOWNSTREAM(FEET) =   375.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   179.00   CHANNEL SLOPE = 0.0223
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.343
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -       0.74     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) =        0.84
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.81
  AVERAGE FLOW DEPTH(FEET) =   0.39    TRAVEL TIME(MIN.) =   1.65
  Tc(MIN.) =   12.69
  SUBAREA AREA(ACRES) =     0.74       SUBAREA RUNOFF(CFS) =    0.56
  EFFECTIVE AREA(ACRES) =     1.40      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       1.4        PEAK FLOW RATE(CFS) =      1.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   1.92
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31502.00 =    505.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  31502.00 TO NODE  31503.00 IS CODE = 51
  ---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  =====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    375.00  DOWNSTREAM(FEET) =    374.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  151.00   CHANNEL SLOPE = 0.0066
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.225
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp       Ap     SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED            -         1.23      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) =      1.46
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  1.32
  AVERAGE FLOW DEPTH(FEET) =  0.61   TRAVEL TIME(MIN.) =  1.90
  Tc(MIN.) =   14.59
  SUBAREA AREA(ACRES) =    1.23      SUBAREA RUNOFF(CFS) =   0.80
  EFFECTIVE AREA(ACRES) =    2.63     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) =      1.71

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.65   FLOW VELOCITY(FEET/SEC.) =   1.37
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31503.00 =    656.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  31503.00 TO NODE  31504.00 IS CODE = 51
  ---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  =====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    374.00  DOWNSTREAM(FEET) =    372.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  184.00   CHANNEL SLOPE = 0.0109
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.153
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp       Ap     SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED            -         2.17      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) =      2.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  1.79
  AVERAGE FLOW DEPTH(FEET) =  0.66   TRAVEL TIME(MIN.) =  1.71
  Tc(MIN.) =   16.30
  SUBAREA AREA(ACRES) =    2.17      SUBAREA RUNOFF(CFS) =   1.27
  EFFECTIVE AREA(ACRES) =    4.80     AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      4.8        PEAK FLOW RATE(CFS) =      2.82
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.71   FLOW VELOCITY(FEET/SEC.) =   1.88
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31504.00 =    840.00 FEET.


***************************************************************************
  FLOW PROCESS FROM NODE  31504.00 TO NODE  31505.00 IS CODE = 51
  -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =    360.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  268.00   CHANNEL SLOPE = 0.0448
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.105
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp       Ap     SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED            -         2.94      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) =      3.62
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.38
  AVERAGE FLOW DEPTH(FEET) =  0.60   TRAVEL TIME(MIN.) =  1.32
  Tc(MIN.) =   17.63
  SUBAREA AREA(ACRES) =    2.94      SUBAREA RUNOFF(CFS) =   1.60
  EFFECTIVE AREA(ACRES) =    7.74     AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      7.7        PEAK FLOW RATE(CFS) =      4.22

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.63   FLOW VELOCITY(FEET/SEC.) =   3.54
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31505.00 =   1108.00 FEET.


***************************************************************************
  FLOW PROCESS FROM NODE  31505.00 TO NODE  31506.00 IS CODE = 51
  -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    360.00  DOWNSTREAM(FEET) =    320.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  622.00   CHANNEL SLOPE = 0.0643
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.020
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp       Ap     SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED            -         6.03      0.50      0.984     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.984
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.33
  AVERAGE FLOW DEPTH(FEET) =  0.66   TRAVEL TIME(MIN.) =  2.39
  Tc(MIN.) =   20.02
  SUBAREA AREA(ACRES) =    6.03      SUBAREA RUNOFF(CFS) =   2.86
  EFFECTIVE AREA(ACRES) =   13.77     AREA-AVERAGED Fm(INCH/HR) =  0.50
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  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   0.99
  TOTAL AREA(ACRES) =        13.8         PEAK FLOW RATE(CFS) =        6.48

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.69   FLOW VELOCITY(FEET/SEC.) =   4.52
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31506.00 =    1730.00 FEET.

**********************************************************************
  FLOW PROCESS FROM NODE  31506.00 TO NODE  31507.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    320.00  DOWNSTREAM(FEET) =    315.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    391.00   CHANNEL SLOPE = 0.0128
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.970
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        2.67      0.50      0.611     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.611
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.13
  AVERAGE FLOW DEPTH(FEET) =   0.88   TRAVEL TIME(MIN.) =   2.08
  Tc(MIN.) =   22.10
  SUBAREA AREA(ACRES) =     2.67        SUBAREA RUNOFF(CFS) =    1.59
  EFFECTIVE AREA(ACRES) =      16.43     AREA-AVERAGED Fm(INCH/HR) =   0.47
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   0.93
  TOTAL AREA(ACRES) =        16.4         PEAK FLOW RATE(CFS) =        7.45

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.89   FLOW VELOCITY(FEET/SEC.) =   3.15
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31507.00 =    2121.00 FEET.

**********************************************************************
  FLOW PROCESS FROM NODE  31507.00 TO NODE  31508.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    315.00  DOWNSTREAM(FEET) =    313.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    427.00   CHANNEL SLOPE = 0.0047
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.898
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       10.20      0.50      0.527     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.34
  AVERAGE FLOW DEPTH(FEET) =   1.22   TRAVEL TIME(MIN.) =   3.05
  Tc(MIN.) =   25.15
```

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  SUBAREA AREA(ACRES) =      10.20        SUBAREA RUNOFF(CFS) =    5.82
  EFFECTIVE AREA(ACRES) =      26.63     AREA-AVERAGED Fm(INCH/HR) =   0.39
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   0.78
  TOTAL AREA(ACRES) =        26.6         PEAK FLOW RATE(CFS) =       12.21

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.29   FLOW VELOCITY(FEET/SEC.) =   2.44
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31508.00 =    2548.00 FEET.

**********************************************************************
  FLOW PROCESS FROM NODE  31508.00 TO NODE  31509.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    313.00  DOWNSTREAM(FEET) =    296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    495.00   CHANNEL SLOPE = 0.0343
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.877
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        8.30      0.50      1.000     -
  USER-DEFINED              -       10.50      0.50      0.500     -
  USER-DEFINED              -        1.60      0.50      0.850     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.731
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.59
  AVERAGE FLOW DEPTH(FEET) =   1.00   TRAVEL TIME(MIN.) =   1.48
  Tc(MIN.) =   26.62
  SUBAREA AREA(ACRES) =      20.40        SUBAREA RUNOFF(CFS) =    9.39
  EFFECTIVE AREA(ACRES) =      47.03     AREA-AVERAGED Fm(INCH/HR) =   0.38
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   0.76
  TOTAL AREA(ACRES) =        47.0         PEAK FLOW RATE(CFS) =       21.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.09   FLOW VELOCITY(FEET/SEC.) =   5.94
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31509.00 =    3043.00 FEET.
===========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       47.0  TC(MIN.) =     26.62
  EFFECTIVE AREA(ACRES) =      47.03  AREA-AVERAGED Fm(INCH/HR)=  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 0.757
  PEAK FLOW RATE(CFS)     =       21.11
===========================================================================
===========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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                           Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 16 EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 5-YR EV MARCH 2019 CCHIU                                             *
 ************************************************************************

  FILE NAME: X31605EV.DAT
  TIME/DATE OF STUDY: 13:51 03/25/2019
=================================================================================
   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  60.0    30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31600.00 TO NODE  31601.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
  ELEVATION DATA: UPSTREAM(FEET) =    672.00  DOWNSTREAM(FEET) =     582.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.296
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.604
  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
  "GRASS"                   -        0.52     0.50     1.000     0    9.30
  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) =      0.52   PEAK FLOW RATE(CFS) =      0.52


********************************************************************************
  FLOW PROCESS FROM NODE  31601.00 TO NODE  31602.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    582.00  DOWNSTREAM(FEET) =    554.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   229.00   CHANNEL SLOPE = 0.1223
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.489
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        1.33     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) =       1.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.68
  AVERAGE FLOW DEPTH(FEET) =   0.32    TRAVEL TIME(MIN.) =   1.04
  Tc(MIN.) =   10.33
  SUBAREA AREA(ACRES) =     1.33       SUBAREA RUNOFF(CFS) =    1.19
  EFFECTIVE AREA(ACRES) =     1.86      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       1.9         PEAK FLOW RATE(CFS) =       1.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.37    FLOW VELOCITY(FEET/SEC.) =   4.04
    LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31602.00 =    558.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31602.00 TO NODE  31603.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    554.00  DOWNSTREAM(FEET) =    545.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   149.00   CHANNEL SLOPE =  0.0604
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -         2.68      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) =       2.79
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.53
   AVERAGE FLOW DEPTH(FEET) =   0.51    TRAVEL TIME(MIN.) =   0.70
   Tc(MIN.) =   11.04
   SUBAREA AREA(ACRES) =    2.68       SUBAREA RUNOFF(CFS) =    2.28
   EFFECTIVE AREA(ACRES) =     4.54     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        4.5          PEAK FLOW RATE(CFS) =       3.86

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.58    FLOW VELOCITY(FEET/SEC.) =   3.87
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31603.00 =    707.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31603.00 TO NODE  31604.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    525.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   184.00   CHANNEL SLOPE =  0.1087
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.409
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         3.07      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) =       5.12
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.16
   AVERAGE FLOW DEPTH(FEET) =   0.58    TRAVEL TIME(MIN.) =   0.59
   Tc(MIN.) =   11.63
   SUBAREA AREA(ACRES) =    3.07       SUBAREA RUNOFF(CFS) =    2.51
   EFFECTIVE AREA(ACRES) =     7.61     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        7.6          PEAK FLOW RATE(CFS) =       6.22
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.62    FLOW VELOCITY(FEET/SEC.) =   5.38
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31604.00 =    891.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  31604.00 TO NODE  31605.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =    495.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   266.00   CHANNEL SLOPE =  0.1128
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.362
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         4.69      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) =       8.04
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.86
   AVERAGE FLOW DEPTH(FEET) =   0.68    TRAVEL TIME(MIN.) =   0.76
   Tc(MIN.) =   12.39
   SUBAREA AREA(ACRES) =    4.69       SUBAREA RUNOFF(CFS) =    3.64
   EFFECTIVE AREA(ACRES) =    12.30     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       12.3          PEAK FLOW RATE(CFS) =       9.54

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.72    FLOW VELOCITY(FEET/SEC.) =   6.10
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31605.00 =   1157.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  31605.00 TO NODE  31606.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    495.00  DOWNSTREAM(FEET) =    470.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   444.00   CHANNEL SLOPE =  0.0563
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.271
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         8.98      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) =      12.66
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.06
   AVERAGE FLOW DEPTH(FEET) =   0.91    TRAVEL TIME(MIN.) =   1.46
   Tc(MIN.) =   13.85
   SUBAREA AREA(ACRES) =    8.98       SUBAREA RUNOFF(CFS) =    6.23
   EFFECTIVE AREA(ACRES) =    21.28     AREA-AVERAGED Fm(INCH/HR) =   0.50
```

```
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       21.3       PEAK FLOW RATE(CFS) =       14.77

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.97   FLOW VELOCITY(FEET/SEC.) =   5.28
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31606.00 =    1601.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31606.00 TO NODE  31607.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    439.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   763.00   CHANNEL SLOPE = 0.0406
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.151
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        20.37    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) =      20.74
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.05
   AVERAGE FLOW DEPTH(FEET) =   1.17   TRAVEL TIME(MIN.) =   2.52
   Tc(MIN.) =   16.37
   SUBAREA AREA(ACRES) =     20.37       SUBAREA RUNOFF(CFS) =   11.93
   EFFECTIVE AREA(ACRES) =      41.65       AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       41.6       PEAK FLOW RATE(CFS) =       24.39

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.24   FLOW VELOCITY(FEET/SEC.) =   5.28
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31607.00 =    2364.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31607.00 TO NODE  31608.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    439.00  DOWNSTREAM(FEET) =    380.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   1396.00   CHANNEL SLOPE = 0.0423
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.008
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        25.28    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) =      30.18
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.62
   AVERAGE FLOW DEPTH(FEET) =   1.34   TRAVEL TIME(MIN.) =   4.14
   Tc(MIN.) =   20.51
```

```
   SUBAREA AREA(ACRES) =     25.28       SUBAREA RUNOFF(CFS) =   11.55
   EFFECTIVE AREA(ACRES) =      66.93       AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       66.9       PEAK FLOW RATE(CFS) =       30.58

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.34   FLOW VELOCITY(FEET/SEC.) =   5.68
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31608.00 =    3760.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31608.00 TO NODE  31609.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    380.00  DOWNSTREAM(FEET) =    350.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   715.00   CHANNEL SLOPE = 0.0420
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.959
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        19.63    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) =      34.63
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.82
   AVERAGE FLOW DEPTH(FEET) =   1.41   TRAVEL TIME(MIN.) =   2.05
   Tc(MIN.) =   22.56
   SUBAREA AREA(ACRES) =     19.63       SUBAREA RUNOFF(CFS) =    8.10
   EFFECTIVE AREA(ACRES) =      86.56       AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       86.6       PEAK FLOW RATE(CFS) =       35.71

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.42   FLOW VELOCITY(FEET/SEC.) =   5.87
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31609.00 =    4475.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31609.00 TO NODE  31610.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    325.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   948.00   CHANNEL SLOPE = 0.0264
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.890
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        17.36    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) =      38.76
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.02
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   AVERAGE FLOW DEPTH(FEET) =   1.61    TRAVEL TIME(MIN.) =    3.15
   Tc(MIN.) =   25.71
   SUBAREA AREA(ACRES) =    17.36      SUBAREA RUNOFF(CFS) =    6.09
   EFFECTIVE AREA(ACRES) =    103.92     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =     103.9      PEAK FLOW RATE(CFS) =      36.47

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   1.57    FLOW VELOCITY(FEET/SEC.) =   4.95
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31610.00 =   5423.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31610.00 TO NODE  31611.00 IS CODE = 51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =    310.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1182.00   CHANNEL SLOPE = 0.0127
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.835
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -        69.76     0.50     0.990     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.990
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      47.14
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.99
   AVERAGE FLOW DEPTH(FEET) =   1.77    TRAVEL TIME(MIN.) =    3.95
   Tc(MIN.) =   29.66
   SUBAREA AREA(ACRES) =    69.76      SUBAREA RUNOFF(CFS) =   21.32
   EFFECTIVE AREA(ACRES) =    173.68     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =     173.7      PEAK FLOW RATE(CFS) =      52.62

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   1.85    FLOW VELOCITY(FEET/SEC.) =   5.12
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31611.00 =   6605.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31611.00 TO NODE  31612.00 IS CODE = 51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    310.00  DOWNSTREAM(FEET) =    308.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  164.00   CHANNEL SLOPE = 0.0122
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.827
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -        17.90     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) =      55.26
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.09
   AVERAGE FLOW DEPTH(FEET) =   1.90    TRAVEL TIME(MIN.) =    0.54
   Tc(MIN.) =   30.19
   SUBAREA AREA(ACRES) =    17.90      SUBAREA RUNOFF(CFS) =    5.27
   EFFECTIVE AREA(ACRES) =    191.58     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =     191.6      PEAK FLOW RATE(CFS) =      56.71

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   1.92    FLOW VELOCITY(FEET/SEC.) =   5.14
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31612.00 =   6769.00 FEET.
=============================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)    =     191.6  TC(MIN.) =     30.19
   EFFECTIVE AREA(ACRES) =    191.58  AREA-AVERAGED Fm(INCH/HR)=  0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap = 0.996
   PEAK FLOW RATE(CFS)   =      56.71
=============================================================================
=============================================================================
   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 *************************
 * RMV PA-3 WATERSHED 17A EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 5-YR EV MARCH 2019 CCHIU                                            *
  *********************************************************************

   FILE NAME: X17A05EV.DAT
   TIME/DATE OF STUDY: 11:18 03/25/2019
 ========================================================================
   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   60.0    30.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31700.00 TO NODE  31701.00 IS CODE =  21
 --------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
   ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    515.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.410
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.423
   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
   "GRASS"                   -       0.43      0.50     1.000      0   11.41
   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) =       0.43   PEAK FLOW RATE(CFS) =      0.35


 **********************************************************************
   FLOW PROCESS FROM NODE  31701.00 TO NODE  31702.00 IS CODE =  51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    515.00  DOWNSTREAM(FEET) =    490.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   218.00    CHANNEL SLOPE = 0.1147
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   *   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               -       0.40      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) =       0.51
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.62
   AVERAGE FLOW DEPTH(FEET) =   0.22    TRAVEL TIME(MIN.) =   1.00
   Tc(MIN.) =   12.41
   SUBAREA AREA(ACRES) =    0.40       SUBAREA RUNOFF(CFS) =    0.31
   EFFECTIVE AREA(ACRES) =      0.83      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       0.8        PEAK FLOW RATE(CFS) =      0.64

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
 DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   3.91
 LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31702.00 =    539.00 FEET.


**********************************************************************
  FLOW PROCESS FROM NODE  31702.00 TO NODE  31703.00 IS CODE =  51
----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE = 0.0833
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.264
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -         1.55     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) =      1.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.23
  AVERAGE FLOW DEPTH(FEET) =  0.35   TRAVEL TIME(MIN.) =   1.55
  Tc(MIN.) =  13.96
  SUBAREA AREA(ACRES) =    1.55      SUBAREA RUNOFF(CFS) =   1.07
  EFFECTIVE AREA(ACRES) =    2.38     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      2.4         PEAK FLOW RATE(CFS) =      1.64

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   3.52
  LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31703.00 =    839.00 FEET.


**********************************************************************
  FLOW PROCESS FROM NODE  31703.00 TO NODE  31704.00 IS CODE =  51
----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =    462.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    83.00   CHANNEL SLOPE = 0.0361
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.235
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -         2.59     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) =      2.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.86
  AVERAGE FLOW DEPTH(FEET) =  0.54   TRAVEL TIME(MIN.) =   0.48
  Tc(MIN.) =  14.44
  SUBAREA AREA(ACRES) =    2.59      SUBAREA RUNOFF(CFS) =   1.71
  EFFECTIVE AREA(ACRES) =    4.97     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      5.0         PEAK FLOW RATE(CFS) =      3.28
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.60   FLOW VELOCITY(FEET/SEC.) =   3.04
  LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31704.00 =    922.00 FEET.


***************************************************************************
  FLOW PROCESS FROM NODE  31704.00 TO NODE  31705.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    462.00  DOWNSTREAM(FEET) =    460.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    60.00   CHANNEL SLOPE = 0.0333
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.215
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -         5.22     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) =      4.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.26
  AVERAGE FLOW DEPTH(FEET) =  0.71   TRAVEL TIME(MIN.) =   0.31
  Tc(MIN.) =  14.75
  SUBAREA AREA(ACRES) =    5.22      SUBAREA RUNOFF(CFS) =   3.36
  EFFECTIVE AREA(ACRES) =   10.19     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =     10.2         PEAK FLOW RATE(CFS) =      6.56

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.79   FLOW VELOCITY(FEET/SEC.) =   3.52
  LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31705.00 =    982.00 FEET.


***************************************************************************
  FLOW PROCESS FROM NODE  31705.00 TO NODE  31706.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    375.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   604.00   CHANNEL SLOPE = 0.1407
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.153
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -         8.10     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) =      8.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.52
  AVERAGE FLOW DEPTH(FEET) =  0.68   TRAVEL TIME(MIN.) =   1.54
  Tc(MIN.) =  16.29
  SUBAREA AREA(ACRES) =    8.10      SUBAREA RUNOFF(CFS) =   4.76
  EFFECTIVE AREA(ACRES) =   18.29     AREA-AVERAGED Fm(INCH/HR) =   0.50
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        18.3        PEAK FLOW RATE(CFS) =      10.75

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.72   FLOW VELOCITY(FEET/SEC.) =   6.88
 LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31706.00 =    1586.00 FEET.
===============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        18.3  TC(MIN.) =      16.29
 EFFECTIVE AREA(ACRES) =      18.29  AREA-AVERAGED Fm(INCH/HR)=  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       10.75
===============================================================================
===============================================================================
 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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                          Analysis prepared by:

                       Michael Baker International
                      5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


   ************************* DESCRIPTION OF STUDY *************************
  * RMV PA-3 WATERSHED 17B EXISTING CONDITION                            *
  * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
  * 5-YR EV MARCH 2019 CCHIU                                             *
   *********************************************************************

    FILE NAME: X17B05EV.DAT
    TIME/DATE OF STUDY: 11:22 03/25/2019
  ========================================================================
    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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
    GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
      1. Relative Flow-Depth =  0.00 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  31710.00 TO NODE  31711.00 IS CODE =  21
  -------------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
    >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
  =======================================================================
    INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
    ELEVATION DATA: UPSTREAM(FEET) =    631.00  DOWNSTREAM(FEET) =    605.00

    Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
    SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.719
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.403
    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
    "CHAPARRAL,BROADLEAF"     -        0.32      0.50      1.000     0   11.72
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
    SUBAREA RUNOFF(CFS) =       0.26
    TOTAL AREA(ACRES) =       0.32   PEAK FLOW RATE(CFS) =       0.26


  *************************************************************************
    FLOW PROCESS FROM NODE  31711.00 TO NODE  31712.00 IS CODE =  51
  -------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  =======================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    588.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    71.00    CHANNEL SLOPE = 0.2394
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.385
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap     SCS
       LAND USE             GROUP     (ACRES) (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -        0.56      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) =       0.48
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.92
    AVERAGE FLOW DEPTH(FEET) =   0.20    TRAVEL TIME(MIN.) =   0.30
    Tc(MIN.) =   12.02
    SUBAREA AREA(ACRES) =      0.56       SUBAREA RUNOFF(CFS) =    0.45
    EFFECTIVE AREA(ACRES) =       0.88      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) =       0.70

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   4.29
    LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31712.00 =     391.00 FEET.


***********************************************************************
    FLOW PROCESS FROM NODE  31712.00 TO NODE  31713.00 IS CODE = 51
-----------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    588.00  DOWNSTREAM(FEET) =    565.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   181.00   CHANNEL SLOPE = 0.1271
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.331
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
          LAND USE          GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
    USER-DEFINED             -         0.31      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) =      0.82
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.50
    AVERAGE FLOW DEPTH(FEET) =  0.28   TRAVEL TIME(MIN.) =   0.86
    Tc(MIN.) =  12.88
    SUBAREA AREA(ACRES) =    0.31      SUBAREA RUNOFF(CFS) =   0.24
    EFFECTIVE AREA(ACRES) =     1.20    AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =   0.50 AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       0.90

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   3.48
    LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31713.00 =     572.00 FEET.


***********************************************************************
    FLOW PROCESS FROM NODE  31713.00 TO NODE  31714.00 IS CODE = 51
-----------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =    545.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   185.00   CHANNEL SLOPE = 0.1081
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 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             -         1.36      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) =      1.37
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.65
    AVERAGE FLOW DEPTH(FEET) =  0.35   TRAVEL TIME(MIN.) =   0.84
    Tc(MIN.) =  13.73
    SUBAREA AREA(ACRES) =    1.36      SUBAREA RUNOFF(CFS) =   0.95
    EFFECTIVE AREA(ACRES) =     2.56    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) =       1.79
```

```
    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   4.00
    LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31714.00 =     757.00 FEET.

***********************************************************************
    FLOW PROCESS FROM NODE  31714.00 TO NODE  31715.00 IS CODE = 51
-----------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    531.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   128.00   CHANNEL SLOPE = 0.1094
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.249
    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
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.73
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.40
    AVERAGE FLOW DEPTH(FEET) =  0.45   TRAVEL TIME(MIN.) =   0.48
    Tc(MIN.) =  14.21
    SUBAREA AREA(ACRES) =    2.80      SUBAREA RUNOFF(CFS) =   1.89
    EFFECTIVE AREA(ACRES) =     5.35    AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =   0.50 AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        5.4         PEAK FLOW RATE(CFS) =       3.61

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   4.69
    LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31715.00 =     885.00 FEET.

***********************************************************************
    FLOW PROCESS FROM NODE  31715.00 TO NODE  31716.00 IS CODE = 51
-----------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM(FEET) =    507.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE = 0.0889
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.195
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
          LAND USE          GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
    USER-DEFINED             -         5.95      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) =      5.47
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.84
    AVERAGE FLOW DEPTH(FEET) =  0.61   TRAVEL TIME(MIN.) =   0.93
    Tc(MIN.) =  15.14
    SUBAREA AREA(ACRES) =    5.95      SUBAREA RUNOFF(CFS) =   3.72
    EFFECTIVE AREA(ACRES) =    11.30    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) =       7.06


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.67   FLOW VELOCITY(FEET/SEC.) =   5.18
 LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31716.00 =    1155.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE  31716.00 TO NODE  31717.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    507.00  DOWNSTREAM(FEET) =    400.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1020.00   CHANNEL SLOPE = 0.1049
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.095
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/        SCS SOIL    AREA      Fp         Ap       SCS
      LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED                -        13.90      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) =     10.79
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.13
 AVERAGE FLOW DEPTH(FEET) =   0.77   TRAVEL TIME(MIN.) =   2.77
 Tc(MIN.) =   17.91
 SUBAREA AREA(ACRES) =     13.90        SUBAREA RUNOFF(CFS) =    7.44
 EFFECTIVE AREA(ACRES) =     25.20     AREA-AVERAGED Fm(INCH/HR) =   0.50
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        25.2         PEAK FLOW RATE(CFS) =      13.49


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.83   FLOW VELOCITY(FEET/SEC.) =   6.46
 LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31717.00 =    2175.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        25.2  TC(MIN.) =     17.91
 EFFECTIVE AREA(ACRES) =      25.20  AREA-AVERAGED Fm(INCH/HR)=  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       13.49
============================================================================
============================================================================
 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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                         Santa Ana, CA 92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 18 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 5-YR EV MARCH 2019 FKAZI                                           *
 **********************************************************************

  FILE NAME: X31805EV.DAT
  TIME/DATE OF STUDY: 13:39 03/28/2019
================================================================================
   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  60.0     30.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31800.00 TO NODE  31801.00 IS CODE =  21
 --------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ====================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.00  DOWNSTREAM(FEET) =    630.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.120
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.628
  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
  "CHAPARRAL,BROADLEAF"      -        0.10     0.50     1.000     0   9.12
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"     -        0.10     0.50     1.000     0   9.12
  NATURAL FAIR COVER
  "OPEN BRUSH"              -        1.30     0.50     1.000     0   9.12
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =   1.000
  SUBAREA RUNOFF(CFS) =       1.52
  TOTAL AREA(ACRES) =       1.50    PEAK FLOW RATE(CFS) =      1.52


 **********************************************************************
  FLOW PROCESS FROM NODE  31801.00 TO NODE  31802.00 IS CODE =  51
 --------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    597.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   196.00    CHANNEL SLOPE = 0.1684
  CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.52
  FLOW VELOCITY(FEET/SEC.) =   4.43    FLOW DEPTH(FEET) =   0.34
  TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    9.86
  LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31802.00 =    525.00 FEET.

 **********************************************************************
  FLOW PROCESS FROM NODE  31802.00 TO NODE  31802.00 IS CODE =  81
 --------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ====================================================================
  MAINLINE Tc(MIN.) =    9.86
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.529
  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             -        1.80      0.50     1.000     -
       USER-DEFINED             -        0.10      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) =   2.00     SUBAREA RUNOFF(CFS) =   1.85
       EFFECTIVE AREA(ACRES) =    3.50   AREA-AVERAGED Fm(INCH/HR) = 0.50
       AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 1.00
       TOTAL AREA(ACRES) =       3.5     PEAK FLOW RATE(CFS) =      3.24

*************************************************************************
   FLOW PROCESS FROM NODE  31802.00 TO NODE  31803.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   597.00  DOWNSTREAM(FEET) =    565.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  225.00   CHANNEL SLOPE = 0.1422
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      3.24
   FLOW VELOCITY(FEET/SEC.) =  5.09   FLOW DEPTH(FEET) =  0.46
   TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =   10.59
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31803.00 =    750.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31803.00 TO NODE  31803.00 IS CODE = 81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   10.59
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.473
   SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
       USER-DEFINED             -        2.10      0.50     1.000     -
       USER-DEFINED             -        0.20      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) =   2.30     SUBAREA RUNOFF(CFS) =   2.01
       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) =      5.08

*************************************************************************
   FLOW PROCESS FROM NODE  31803.00 TO NODE  31804.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   565.00  DOWNSTREAM(FEET) =    530.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  228.00   CHANNEL SLOPE = 0.1535
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      5.08
   FLOW VELOCITY(FEET/SEC.) =  5.87   FLOW DEPTH(FEET) =  0.54
```

```
   TRAVEL TIME(MIN.) =   0.65   Tc(MIN.) =   11.24
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31804.00 =    978.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31804.00 TO NODE  31804.00 IS CODE = 81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   11.24
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.433
   SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
       USER-DEFINED             -        4.10      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) =   4.70     SUBAREA RUNOFF(CFS) =   3.95
       EFFECTIVE AREA(ACRES) =   10.50   AREA-AVERAGED Fm(INCH/HR) = 0.50
       AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 1.00
       TOTAL AREA(ACRES) =      10.5     PEAK FLOW RATE(CFS) =      8.82

*************************************************************************
   FLOW PROCESS FROM NODE  31804.00 TO NODE  31805.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   530.00  DOWNSTREAM(FEET) =    498.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  414.00   CHANNEL SLOPE = 0.0773
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      8.82
   FLOW VELOCITY(FEET/SEC.) =  5.19   FLOW DEPTH(FEET) =  0.75
   TRAVEL TIME(MIN.) =   1.33   Tc(MIN.) =   12.57
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31805.00 =   1392.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31805.00 TO NODE  31805.00 IS CODE = 81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   12.57
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.351
   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             -        5.70      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) =   6.70     SUBAREA RUNOFF(CFS) =   5.13
       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) =     13.16

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

```
     FLOW PROCESS FROM NODE   31805.00 TO NODE   31806.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    498.00  DOWNSTREAM(FEET) =    454.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  678.00   CHANNEL SLOPE =  0.0649
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      13.16
   FLOW VELOCITY(FEET/SEC.) =   5.38   FLOW DEPTH(FEET) =   0.90
   TRAVEL TIME(MIN.) =   2.10   Tc(MIN.) =   14.67
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31806.00 =   2070.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE   31806.00 TO NODE   31806.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =   14.67
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.220
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -       2.10     0.50      1.000      -
   USER-DEFINED              -       0.40     0.50      1.000      -
   USER-DEFINED              -       7.90     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) =   10.40      SUBAREA RUNOFF(CFS) =    6.74
   EFFECTIVE AREA(ACRES) =     27.60   AREA-AVERAGED Fm(INCH/HR) = 0.50
   AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =      27.6      PEAK FLOW RATE(CFS) =     17.89

*******************************************************************************
   FLOW PROCESS FROM NODE   31806.00 TO NODE   31819.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    454.00  DOWNSTREAM(FEET) =    410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  737.00   CHANNEL SLOPE =  0.0597
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      17.89
   FLOW VELOCITY(FEET/SEC.) =   5.65   FLOW DEPTH(FEET) =   1.03
   TRAVEL TIME(MIN.) =   2.17   Tc(MIN.) =   16.84
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31819.00 =   2807.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE   31819.00 TO NODE   31819.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =   16.84
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.134
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
```

```
       LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -       0.70     0.50      1.000      -
   USER-DEFINED              -       0.30     0.50      1.000      -
   USER-DEFINED              -       5.60     0.50      1.000      -
   USER-DEFINED              -       0.50     0.50      1.000      -
   USER-DEFINED              -       0.30     0.50      1.000      -
   USER-DEFINED              -       6.30     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) =   13.70      SUBAREA RUNOFF(CFS) =    7.81
   EFFECTIVE AREA(ACRES) =     41.30   AREA-AVERAGED Fm(INCH/HR) = 0.50
   AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =      41.3      PEAK FLOW RATE(CFS) =     23.54

*******************************************************************************
   FLOW PROCESS FROM NODE   31819.00 TO NODE   31819.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =   16.84
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.134
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -       0.20     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) =   0.20      SUBAREA RUNOFF(CFS) =    0.11
   EFFECTIVE AREA(ACRES) =     41.50   AREA-AVERAGED Fm(INCH/HR) = 0.50
   AREA-AVERAGED Fp(INCH/HR) = 0.50 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =      41.5      PEAK FLOW RATE(CFS) =     23.66

*******************************************************************************
   FLOW PROCESS FROM NODE   31819.00 TO NODE   31819.00 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.) =   16.84
   RAINFALL INTENSITY(INCH/HR) =   1.13
   AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =     41.50
   TOTAL STREAM AREA(ACRES) =     41.50
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      23.66

*******************************************************************************
   FLOW PROCESS FROM NODE   31810.00 TO NODE   31811.00 IS CODE =  21
-------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  395.00
   ELEVATION DATA: UPSTREAM(FEET) =    697.00  DOWNSTREAM(FEET) =    645.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

```
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.576
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.412
  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   11.58
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =       0.40    PEAK FLOW RATE(CFS) =       0.33

**************************************************************************
  FLOW PROCESS FROM NODE  31811.00 TO NODE  31812.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =     610.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  148.00   CHANNEL SLOPE = 0.2365
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.33
  FLOW VELOCITY(FEET/SEC.) =  3.44   FLOW DEPTH(FEET) =  0.18
  TRAVEL TIME(MIN.) =  0.72   Tc(MIN.) =   12.29
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31812.00 =    543.00 FEET.
**************************************************************************
  FLOW PROCESS FROM NODE  31812.00 TO NODE  31812.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   12.29
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.368
  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     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   0.30     SUBAREA RUNOFF(CFS) =    0.23
  EFFECTIVE AREA(ACRES) =      0.70   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        0.7      PEAK FLOW RATE(CFS) =       0.55

**************************************************************************
  FLOW PROCESS FROM NODE  31812.00 TO NODE  31813.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =     591.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  176.00   CHANNEL SLOPE = 0.1080
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.55
  FLOW VELOCITY(FEET/SEC.) =  2.94   FLOW DEPTH(FEET) =  0.25
  TRAVEL TIME(MIN.) =  1.00   Tc(MIN.) =   13.29
```

```
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31813.00 =    719.00 FEET.
**************************************************************************
  FLOW PROCESS FROM NODE  31813.00 TO NODE  31813.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   13.29
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.306
  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     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   1.10     SUBAREA RUNOFF(CFS) =    0.80
  EFFECTIVE AREA(ACRES) =      1.80   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.8      PEAK FLOW RATE(CFS) =       1.31

**************************************************************************
  FLOW PROCESS FROM NODE  31813.00 TO NODE  31814.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    591.00  DOWNSTREAM(FEET) =    576.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  184.00   CHANNEL SLOPE = 0.0815
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.31
  FLOW VELOCITY(FEET/SEC.) =  3.30   FLOW DEPTH(FEET) =  0.36
  TRAVEL TIME(MIN.) =  0.93   Tc(MIN.) =   14.22
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31814.00 =    903.00 FEET.
**************************************************************************
  FLOW PROCESS FROM NODE  31814.00 TO NODE  31814.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   14.22
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.248
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         3.50     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) =   3.50     SUBAREA RUNOFF(CFS) =    2.36
  EFFECTIVE AREA(ACRES) =      5.30   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.3      PEAK FLOW RATE(CFS) =       3.57

**************************************************************************
  FLOW PROCESS FROM NODE  31814.00 TO NODE  31815.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    576.00  DOWNSTREAM(FEET) =     566.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  120.00   CHANNEL SLOPE = 0.0833
   CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      3.57
   FLOW VELOCITY(FEET/SEC.) =  4.25   FLOW DEPTH(FEET) =   0.53
   TRAVEL TIME(MIN.) =   0.47   Tc(MIN.) =   14.69
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31815.00 =   1023.00 FEET.


*****************************************************************************
   FLOW PROCESS FROM NODE  31815.00 TO NODE  31815.00 IS CODE = 81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   14.69
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.219
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        3.10       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) =   3.10     SUBAREA RUNOFF(CFS) =    2.01
   EFFECTIVE AREA(ACRES) =       8.40   AREA-AVERAGED Fm(INCH/HR) = 0.50
   AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        8.4      PEAK FLOW RATE(CFS) =     5.43
*****************************************************************************
   FLOW PROCESS FROM NODE  31815.00 TO NODE  31816.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    566.00  DOWNSTREAM(FEET) =     544.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.1009
   CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      5.43
   FLOW VELOCITY(FEET/SEC.) =  5.07   FLOW DEPTH(FEET) =   0.60
   TRAVEL TIME(MIN.) =   0.72   Tc(MIN.) =   15.41
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31816.00 =   1241.00 FEET.


*****************************************************************************
   FLOW PROCESS FROM NODE  31816.00 TO NODE  31816.00 IS CODE = 81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   15.41
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.185
   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              -        4.70       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) =   5.80      SUBAREA RUNOFF(CFS) =    3.58
```

```
   EFFECTIVE AREA(ACRES) =       14.20   AREA-AVERAGED Fm(INCH/HR) = 0.50
   AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        14.2      PEAK FLOW RATE(CFS) =     8.76
*****************************************************************************
   FLOW PROCESS FROM NODE  31816.00 TO NODE  31817.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    544.00  DOWNSTREAM(FEET) =     488.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  668.00   CHANNEL SLOPE = 0.0838
   CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      8.76
   FLOW VELOCITY(FEET/SEC.) =  5.37   FLOW DEPTH(FEET) =   0.74
   TRAVEL TIME(MIN.) =   2.07   Tc(MIN.) =   17.48
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31817.00 =   1909.00 FEET.


*****************************************************************************
   FLOW PROCESS FROM NODE  31817.00 TO NODE  31817.00 IS CODE = 81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   17.48
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.111
   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              -       12.40       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) =   12.50      SUBAREA RUNOFF(CFS) =    6.87
   EFFECTIVE AREA(ACRES) =       26.70   AREA-AVERAGED Fm(INCH/HR) = 0.50
   AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        26.7      PEAK FLOW RATE(CFS) =    14.67
*****************************************************************************
   FLOW PROCESS FROM NODE  31817.00 TO NODE  31818.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    488.00  DOWNSTREAM(FEET) =     442.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  580.00   CHANNEL SLOPE = 0.0793
   CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =     14.67
   FLOW VELOCITY(FEET/SEC.) =  5.97   FLOW DEPTH(FEET) =   0.91
   TRAVEL TIME(MIN.) =   1.62   Tc(MIN.) =   19.10
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31818.00 =   2489.00 FEET.


*****************************************************************************
   FLOW PROCESS FROM NODE  31818.00 TO NODE  31818.00 IS CODE = 81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
```

```
      MAINLINE Tc(MIN.) =   19.10
      *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.052
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap     SCS
            LAND USE          GROUP     (ACRES)   (INCH/HR) (DECIMAL)  CN
      USER-DEFINED              -         2.60      0.50      1.000     -
      USER-DEFINED              -        14.90      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) =   17.50     SUBAREA RUNOFF(CFS) =    8.70
      EFFECTIVE AREA(ACRES) =    44.20   AREA-AVERAGED Fm(INCH/HR) = 0.50
      AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 1.00
      TOTAL AREA(ACRES) =      44.2      PEAK FLOW RATE(CFS) =      21.96

    *****************************************************************************
      FLOW PROCESS FROM NODE  31818.00 TO NODE  31819.00 IS CODE = 51
    -----------------------------------------------------------------------------
      >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
      >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
    =============================================================================
      ELEVATION DATA: UPSTREAM(FEET) =   442.00  DOWNSTREAM(FEET) =    410.00
      CHANNEL LENGTH THRU SUBAREA(FEET) =   646.00   CHANNEL SLOPE = 0.0495
      CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
      CHANNEL FLOW THRU SUBAREA(CFS) =      21.96
      FLOW VELOCITY(FEET/SEC.) =   5.54   FLOW DEPTH(FEET) =   1.15
      TRAVEL TIME(MIN.) =   1.94   Tc(MIN.) =   21.04
      LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31819.00 =   3135.00 FEET.
    *****************************************************************************
      FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE = 81
    -----------------------------------------------------------------------------
      >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
    =============================================================================
      MAINLINE Tc(MIN.) =   21.04
      *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.995
      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              -         0.80      0.50      1.000     -
      USER-DEFINED              -         7.10      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) =    8.20     SUBAREA RUNOFF(CFS) =    3.65
      EFFECTIVE AREA(ACRES) =    52.40   AREA-AVERAGED Fm(INCH/HR) = 0.50
      AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 1.00
      TOTAL AREA(ACRES) =      52.4      PEAK FLOW RATE(CFS) =      23.33

    *****************************************************************************
      FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 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.) =   21.04
```

```
      RAINFALL INTENSITY(INCH/HR) =    0.99
      AREA-AVERAGED Fm(INCH/HR) =  0.50
      AREA-AVERAGED Fp(INCH/HR) =  0.50
      AREA-AVERAGED Ap =  1.00
      EFFECTIVE STREAM AREA(ACRES) =      52.40
      TOTAL STREAM AREA(ACRES) =       52.40
      PEAK FLOW RATE(CFS) AT CONFLUENCE =       23.33

      ** CONFLUENCE DATA **
      STREAM      Q      Tc    Intensity   Fp(Fm)      Ap     Ae      HEADWATER
      NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)    NODE
        1      23.66   16.84    1.134    0.50( 0.50)  1.00     41.5   31800.00
        2      23.33   21.04    0.995    0.50( 0.50)  1.00     52.4   31810.00

      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      46.99   16.84    1.134    0.50( 0.50)  1.00     83.4   31800.00
        2      41.81   21.04    0.995    0.50( 0.50)  1.00     93.9   31810.00

      COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
      PEAK FLOW RATE(CFS) =       46.99    Tc(MIN.) =    16.84
      EFFECTIVE AREA(ACRES) =     83.44   AREA-AVERAGED Fm(INCH/HR) =  0.50
      AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 1.00
      TOTAL AREA(ACRES) =        93.9
      LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31819.00 =    3135.00 FEET.

    *****************************************************************************
      FLOW PROCESS FROM NODE  31819.00 TO NODE  31820.00 IS CODE = 51
    -----------------------------------------------------------------------------
      >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
      >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
    =============================================================================
      ELEVATION DATA: UPSTREAM(FEET) =   410.00  DOWNSTREAM(FEET) =    363.00
      CHANNEL LENGTH THRU SUBAREA(FEET) =  1134.00   CHANNEL SLOPE = 0.0414
      CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
      CHANNEL FLOW THRU SUBAREA(CFS) =      46.99
      FLOW VELOCITY(FEET/SEC.) =   6.24   FLOW DEPTH(FEET) =   1.58
      TRAVEL TIME(MIN.) =   3.03   Tc(MIN.) =   19.87
      LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31820.00 =    4269.00 FEET.

    *****************************************************************************
      FLOW PROCESS FROM NODE  31820.00 TO NODE  31820.00 IS CODE = 81
    -----------------------------------------------------------------------------
      >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
    =============================================================================
      MAINLINE Tc(MIN.) =   19.87
      *   5 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              -         0.40      0.50      1.000     -
      USER-DEFINED              -         2.30      0.50      1.000     -
      USER-DEFINED              -         1.70      0.50      1.000     -
```

```
 USER-DEFINED              -        3.30      0.50     1.000    -
 USER-DEFINED              -        2.50      0.50     1.000    -
 USER-DEFINED              -        8.50      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) =   18.70     SUBAREA RUNOFF(CFS) =    8.83
 EFFECTIVE AREA(ACRES) =   102.14   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      112.6      PEAK FLOW RATE(CFS) =       48.21

***************************************************************************
 FLOW PROCESS FROM NODE  31820.00 TO NODE  31820.00 IS CODE =  81
---------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
 MAINLINE Tc(MIN.) =   19.87
 *   5 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              -        0.40      0.50     1.000    -
 USER-DEFINED              -        0.80      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) =    1.50     SUBAREA RUNOFF(CFS) =    0.71
 EFFECTIVE AREA(ACRES) =   103.64   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      114.1      PEAK FLOW RATE(CFS) =       48.92

***************************************************************************
 FLOW PROCESS FROM NODE  31820.00 TO NODE  31821.00 IS CODE =  51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   363.00  DOWNSTREAM(FEET) =   325.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   614.00   CHANNEL SLOPE =  0.0619
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     48.92
 FLOW VELOCITY(FEET/SEC.) =   7.34    FLOW DEPTH(FEET) =   1.49
 TRAVEL TIME(MIN.) =   1.39    Tc(MIN.) =    21.27
 LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31821.00 =    4883.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  31821.00 TO NODE  31821.00 IS CODE =  81
---------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
 MAINLINE Tc(MIN.) =   21.27
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.990
 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      0.50     1.000    -
 USER-DEFINED              -        1.40      0.50     1.000    -
 USER-DEFINED              -        0.90      0.50     1.000    -
```

```
 USER-DEFINED              -        1.00      0.50     1.000    -
 USER-DEFINED              -        0.50      0.50     1.000    -
 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) =    4.50     SUBAREA RUNOFF(CFS) =    1.98
 EFFECTIVE AREA(ACRES) =   108.14   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      118.6      PEAK FLOW RATE(CFS) =       48.92
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

***************************************************************************
 FLOW PROCESS FROM NODE  31821.00 TO NODE  31821.00 IS CODE =  81
---------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
 MAINLINE Tc(MIN.) =   21.27
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.990
 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      0.50     1.000    -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) =    0.20     SUBAREA RUNOFF(CFS) =    0.09
 EFFECTIVE AREA(ACRES) =   108.34   AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      118.8      PEAK FLOW RATE(CFS) =       48.92
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

===========================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =      118.8  TC(MIN.) =      21.27
 EFFECTIVE AREA(ACRES)  =    108.34  AREA-AVERAGED Fm(INCH/HR)=  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.000
 PEAK FLOW RATE(CFS)    =       48.92

 ** PEAK FLOW RATE TABLE **
  STREAM     Q      Tc   Intensity  Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1      48.92  21.27   0.990   0.50( 0.50) 1.00    108.3  31800.00
     2      43.13  25.60   0.892   0.50( 0.50) 1.00    118.8  31810.00
===========================================================================
===========================================================================
 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 *************************
 * RMV PA-4 WATERSHED 2 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 5-YR EV MARCH 2019 CCHIU                                           *
 **********************************************************************

  FILE NAME: X40205EV.DAT
  TIME/DATE OF STUDY: 11:11 03/26/2019
================================================================================
   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  60.0     30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  40200.00 TO NODE  40201.00 IS CODE =  21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   319.00
   ELEVATION DATA: UPSTREAM(FEET) =    647.00  DOWNSTREAM(FEET) =    555.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.085
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.633
   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
   "CHAPARRAL,BROADLEAF"      -        0.30     0.50     1.000     0    9.08
   NATURAL FAIR COVER
   "OPEN BRUSH"              -        0.20     0.50     1.000     0    9.08
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.51
   TOTAL AREA(ACRES) =        0.50   PEAK FLOW RATE(CFS) =       0.51


 **************************************************************************
   FLOW PROCESS FROM NODE  40201.00 TO NODE  40202.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    555.00  DOWNSTREAM(FEET) =    525.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00    CHANNEL SLOPE = 0.2000
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =    1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =        0.51
   FLOW VELOCITY(FEET/SEC.) =    3.62   FLOW DEPTH(FEET) =    0.22
   TRAVEL TIME(MIN.) =    0.69   Tc(MIN.) =     9.77
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40202.00 =    469.00 FEET.


 **************************************************************************
   FLOW PROCESS FROM NODE  40202.00 TO NODE  40202.00 IS CODE =  81
 ------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ========================================================================
   MAINLINE Tc(MIN.) =    9.77
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.540
   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              -        0.10      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) =    0.70     SUBAREA RUNOFF(CFS) =     0.66
   EFFECTIVE AREA(ACRES) =      1.20   AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =         1.2      PEAK FLOW RATE(CFS) =      1.12

***************************************************************************
   FLOW PROCESS FROM NODE  40202.00 TO NODE  40203.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =    505.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE = 0.1143
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      1.12
   FLOW VELOCITY(FEET/SEC.) =  3.58   FLOW DEPTH(FEET) =   0.32
   TRAVEL TIME(MIN.) =  0.81   Tc(MIN.) =   10.59
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40203.00 =    644.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40203.00 TO NODE  40203.00 IS CODE =  81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   10.59
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.473
   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              -        0.10      0.50     1.000      -
   USER-DEFINED              -        0.40      0.50     1.000      -
   USER-DEFINED              -        0.10      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) =    0.70     SUBAREA RUNOFF(CFS) =     0.61
   EFFECTIVE AREA(ACRES) =      1.90   AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =         1.9      PEAK FLOW RATE(CFS) =      1.66

***************************************************************************
   FLOW PROCESS FROM NODE  40203.00 TO NODE  40204.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    505.00  DOWNSTREAM(FEET) =    493.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.0550
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      1.66
   FLOW VELOCITY(FEET/SEC.) =  3.00   FLOW DEPTH(FEET) =   0.43
```

```
   TRAVEL TIME(MIN.) =   1.21   Tc(MIN.) =   11.80
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40204.00 =    862.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40204.00 TO NODE  40204.00 IS CODE =  81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   11.80
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.398
   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              -        0.10      0.50     1.000      -
   USER-DEFINED              -        0.30      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) =    1.40     SUBAREA RUNOFF(CFS) =     1.13
   EFFECTIVE AREA(ACRES) =      3.30   AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =         3.3      PEAK FLOW RATE(CFS) =      2.67

***************************************************************************
   FLOW PROCESS FROM NODE  40204.00 TO NODE  40205.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    493.00  DOWNSTREAM(FEET) =    472.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.0963
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      2.67
   FLOW VELOCITY(FEET/SEC.) =  4.19   FLOW DEPTH(FEET) =   0.46
   TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =   12.67
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40205.00 =   1080.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40205.00 TO NODE  40205.00 IS CODE =  81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   12.67
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.345
   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              -        0.10      0.50     1.000      -
   USER-DEFINED              -        0.30      0.50     1.000      -
   USER-DEFINED              -        1.30      0.50     1.000      -
   USER-DEFINED              -        0.20      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) =    1.60
   EFFECTIVE AREA(ACRES) =      5.40   AREA-AVERAGED Fm(INCH/HR) =  0.50
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.4      PEAK FLOW RATE(CFS) =        4.10


**************************************************************************
  FLOW PROCESS FROM NODE  40205.00 TO NODE  40206.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    472.00  DOWNSTREAM(FEET) =     455.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   71.00   CHANNEL SLOPE =  0.2394
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.10
  FLOW VELOCITY(FEET/SEC.) =    6.61    FLOW DEPTH(FEET) =   0.45
  TRAVEL TIME(MIN.) =    0.18   Tc(MIN.) =   12.85
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40206.00 =    1151.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40206.00 TO NODE  40206.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   12.85
  *    5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.334
  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             -          0.30      0.50     1.000      -
  USER-DEFINED             -          0.20      0.50     1.000      -
  USER-DEFINED             -          1.10      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) =       3.80      SUBAREA RUNOFF(CFS) =     2.85
  EFFECTIVE AREA(ACRES) =       9.20   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.2      PEAK FLOW RATE(CFS) =        6.90

**************************************************************************
  FLOW PROCESS FROM NODE  40206.00 TO NODE  40207.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =     400.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  396.00   CHANNEL SLOPE =  0.1389
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.90
  FLOW VELOCITY(FEET/SEC.) =    6.08    FLOW DEPTH(FEET) =   0.62
  TRAVEL TIME(MIN.) =    1.09   Tc(MIN.) =   13.93
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40207.00 =    1547.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40207.00 TO NODE  40207.00 IS CODE =  81
--------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   13.93
  *    5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
  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             -          0.20      0.50     1.000      -
  USER-DEFINED             -          1.10      0.50     1.000      -
  USER-DEFINED             -          0.90      0.50     1.000      -
  USER-DEFINED             -          2.90      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) =       6.30      SUBAREA RUNOFF(CFS) =     4.34
  EFFECTIVE AREA(ACRES) =      15.50   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.5      PEAK FLOW RATE(CFS) =       10.69

**************************************************************************
  FLOW PROCESS FROM NODE  40207.00 TO NODE  40208.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    400.00  DOWNSTREAM(FEET) =     384.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  452.00   CHANNEL SLOPE =  0.0354
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.69
  FLOW VELOCITY(FEET/SEC.) =    5.02    FLOW DEPTH(FEET) =   0.84
  TRAVEL TIME(MIN.) =    1.50   Tc(MIN.) =   15.43
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40208.00 =    1999.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   15.43
  *    5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.184
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap       SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -          0.10      0.50     1.000      -
  USER-DEFINED             -          0.90      0.50     1.000      -
  USER-DEFINED             -          1.70      0.50     1.000      -
  USER-DEFINED             -          0.10      0.50     1.000      -
  USER-DEFINED             -          0.20      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) =       3.00      SUBAREA RUNOFF(CFS) =     1.85
  EFFECTIVE AREA(ACRES) =      18.50   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.5      PEAK FLOW RATE(CFS) =       11.39

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

```
   FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   15.43
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.184
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL    AREA      Fp         Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED               -        0.70     0.50      1.000      -
   USER-DEFINED               -        1.30     0.50      1.000      -
   USER-DEFINED               -        1.60     0.50      1.000      -
   USER-DEFINED               -        0.90     0.50      1.000      -
   USER-DEFINED               -        2.10     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) =    7.20     SUBAREA RUNOFF(CFS) =    4.43
   EFFECTIVE AREA(ACRES) =     25.70   AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      25.7       PEAK FLOW RATE(CFS) =      15.83

*******************************************************************************
   FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   15.43
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.184
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL    AREA      Fp         Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED               -        2.00     0.50      1.000      -
   USER-DEFINED               -        0.20     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) =    2.80     SUBAREA RUNOFF(CFS) =    1.72
   EFFECTIVE AREA(ACRES) =     28.50   AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      28.5       PEAK FLOW RATE(CFS) =      17.55


*******************************************************************************
   FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   15.43
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.184
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL    AREA      Fp         Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED               -        0.70     0.50      0.100      -
   USER-DEFINED               -        0.10     0.50      0.500      -
   USER-DEFINED               -        1.60     0.50      1.000      -
   USER-DEFINED               -        1.20     0.50      1.000      -
   USER-DEFINED               -        0.20     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 =  0.852
   SUBAREA AREA(ACRES) =    4.60     SUBAREA RUNOFF(CFS) =    3.14
   EFFECTIVE AREA(ACRES) =     33.10   AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.98
   TOTAL AREA(ACRES) =      33.1       PEAK FLOW RATE(CFS) =      20.69

*******************************************************************************
   FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   15.43
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.184
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL    AREA      Fp         Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED               -        0.40     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) =    0.25
   EFFECTIVE AREA(ACRES) =     33.50   AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.98
   TOTAL AREA(ACRES) =      33.5       PEAK FLOW RATE(CFS) =      20.94
================================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =        33.5  TC(MIN.) =     15.43
   EFFECTIVE AREA(ACRES) =      33.50  AREA-AVERAGED Fm(INCH/HR)=  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 0.980
   PEAK FLOW RATE(CFS)    =       20.94
================================================================================
================================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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

                    Michael Baker International
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                       Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY ************************
 * RMV PA-4 WATERSHED 3 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                             *
 * 5-YR EV MARCH 2019 CCHIU                                          *
 ********************************************************************

  FILE NAME: X40305EV.DAT
  TIME/DATE OF STUDY: 14:04 03/25/2019
=================================================================
  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  60.0     30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0     25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0     20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0     15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0     10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  40300.00 TO NODE  40301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
  ELEVATION DATA: UPSTREAM(FEET) =   790.00  DOWNSTREAM(FEET) =    720.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.541
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.571
  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
  "CHAPARRAL,BROADLEAF"       -         0.39     0.50     1.000    0   9.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.38
  TOTAL AREA(ACRES) =       0.39   PEAK FLOW RATE(CFS) =       0.38


****************************************************************************
  FLOW PROCESS FROM NODE  40301.00 TO NODE  40302.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =    675.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   191.00   CHANNEL SLOPE = 0.2356
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.492
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL    AREA      Fp         Ap    SCS
     LAND USE               GROUP     (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED                -         0.88     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) =       0.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.23
  AVERAGE FLOW DEPTH(FEET) =  0.25    TRAVEL TIME(MIN.) =   0.75
  Tc(MIN.) =   10.29
  SUBAREA AREA(ACRES) =    0.88      SUBAREA RUNOFF(CFS) =    0.79
  EFFECTIVE AREA(ACRES) =     1.28     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) =      1.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   4.68
    LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40302.00 =    507.00 FEET.


*********************************************************************
    FLOW PROCESS FROM NODE  40302.00 TO NODE  40303.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =    625.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   179.00   CHANNEL SLOPE = 0.2793
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.458
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED              -         0.84      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) =       1.50
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.47
    AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =   0.54
    Tc(MIN.) =   10.84
    SUBAREA AREA(ACRES) =     0.84      SUBAREA RUNOFF(CFS) =    0.72
    EFFECTIVE AREA(ACRES) =      2.12     AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =        2.1         PEAK FLOW RATE(CFS) =       1.82

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   5.75
    LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40303.00 =    686.00 FEET.


*********************************************************************
    FLOW PROCESS FROM NODE  40303.00 TO NODE  40304.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    625.00  DOWNSTREAM(FEET) =    557.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   161.00   CHANNEL SLOPE = 0.4224
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.436
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED              -         2.94      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) =       3.06
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.49
    AVERAGE FLOW DEPTH(FEET) =   0.37   TRAVEL TIME(MIN.) =   0.36
    Tc(MIN.) =   11.20
    SUBAREA AREA(ACRES) =     2.94      SUBAREA RUNOFF(CFS) =    2.48
    EFFECTIVE AREA(ACRES) =      5.06     AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =        5.1         PEAK FLOW RATE(CFS) =       4.26
```

```
    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   8.17
    LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40304.00 =    847.00 FEET.


***************************************************************************
    FLOW PROCESS FROM NODE  40304.00 TO NODE  40305.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    557.00  DOWNSTREAM(FEET) =    548.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    42.00   CHANNEL SLOPE = 0.2143
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.429
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED              -         1.68      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) =       4.96
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.59
    AVERAGE FLOW DEPTH(FEET) =   0.50   TRAVEL TIME(MIN.) =   0.11
    Tc(MIN.) =   11.30
    SUBAREA AREA(ACRES) =     1.68      SUBAREA RUNOFF(CFS) =    1.40
    EFFECTIVE AREA(ACRES) =      6.73     AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =        6.7         PEAK FLOW RATE(CFS) =       5.63

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =   6.85
    LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40305.00 =    889.00 FEET.


***************************************************************************
    FLOW PROCESS FROM NODE  40305.00 TO NODE  40306.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    548.00  DOWNSTREAM(FEET) =    515.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   217.00   CHANNEL SLOPE = 0.1521
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.395
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED              -         4.67      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) =       7.51
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.46
    AVERAGE FLOW DEPTH(FEET) =   0.62   TRAVEL TIME(MIN.) =   0.56
    Tc(MIN.) =   11.86
    SUBAREA AREA(ACRES) =     4.67      SUBAREA RUNOFF(CFS) =    3.76
    EFFECTIVE AREA(ACRES) =     11.41     AREA-AVERAGED Fm(INCH/HR) =   0.50
```

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  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       11.4        PEAK FLOW RATE(CFS) =         9.18

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.67   FLOW VELOCITY(FEET/SEC.) =   6.73
  LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40306.00 =    1106.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40306.00 TO NODE  40307.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    515.00  DOWNSTREAM(FEET) =    502.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE = 0.0722
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.361
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp       Ap     SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        8.44      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) =      12.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.52
  AVERAGE FLOW DEPTH(FEET) =   0.87   TRAVEL TIME(MIN.) =   0.54
  Tc(MIN.) =   12.41
  SUBAREA AREA(ACRES) =      8.44        SUBAREA RUNOFF(CFS) =      6.54
  EFFECTIVE AREA(ACRES) =     19.84       AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       19.8        PEAK FLOW RATE(CFS) =        15.37

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.94   FLOW VELOCITY(FEET/SEC.) =   5.85
  LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40307.00 =    1286.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40307.00 TO NODE  40308.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    502.00  DOWNSTREAM(FEET) =    469.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   553.00   CHANNEL SLOPE = 0.0597
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.260
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp       Ap     SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       10.07      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) =      18.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.69
  AVERAGE FLOW DEPTH(FEET) =   1.05   TRAVEL TIME(MIN.) =   1.62
  Tc(MIN.) =   14.03
```

```
  SUBAREA AREA(ACRES) =      10.07        SUBAREA RUNOFF(CFS) =      6.89
  EFFECTIVE AREA(ACRES) =     29.92       AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       29.9        PEAK FLOW RATE(CFS) =        20.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.08   FLOW VELOCITY(FEET/SEC.) =   5.84
  LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40308.00 =    1839.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40308.00 TO NODE  40309.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    469.00  DOWNSTREAM(FEET) =    433.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   631.00   CHANNEL SLOPE = 0.0571
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.171
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp       Ap     SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        9.09      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) =      23.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.88
  AVERAGE FLOW DEPTH(FEET) =   1.15   TRAVEL TIME(MIN.) =   1.79
  Tc(MIN.) =   15.81
  SUBAREA AREA(ACRES) =      9.09        SUBAREA RUNOFF(CFS) =      5.48
  EFFECTIVE AREA(ACRES) =     39.01       AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       39.0        PEAK FLOW RATE(CFS) =        23.54

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.15   FLOW VELOCITY(FEET/SEC.) =   5.94
  LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40309.00 =    2470.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40309.00 TO NODE  40310.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    433.00  DOWNSTREAM(FEET) =    406.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   595.00   CHANNEL SLOPE = 0.0454
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.107
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp       Ap     SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       11.61      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) =      26.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.59
```

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 AVERAGE FLOW DEPTH(FEET) =   1.26   TRAVEL TIME(MIN.) =   1.77
 Tc(MIN.) =  17.59
 SUBAREA AREA(ACRES) =   11.61      SUBAREA RUNOFF(CFS) =   6.34
 EFFECTIVE AREA(ACRES) =     50.62    AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      50.6       PEAK FLOW RATE(CFS) =     27.64

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.28   FLOW VELOCITY(FEET/SEC.) =  5.65
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40310.00 =   3065.00 FEET.
*************************************************************************
 FLOW PROCESS FROM NODE  40310.00 TO NODE  40311.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    406.00  DOWNSTREAM(FEET) =    353.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1122.00   CHANNEL SLOPE =  0.0472
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
 *   5 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            -       15.32     0.50      0.897      -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.897
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      31.55
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.37
 AVERAGE FLOW DEPTH(FEET) =   1.19   TRAVEL TIME(MIN.) =   2.54
 Tc(MIN.) =  20.13
 SUBAREA AREA(ACRES) =   15.32      SUBAREA RUNOFF(CFS) =   7.84
 EFFECTIVE AREA(ACRES) =     65.94    AREA-AVERAGED Fm(INCH/HR) =  0.49
 AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  0.98
 TOTAL AREA(ACRES) =      65.9       PEAK FLOW RATE(CFS) =     31.38

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.19   FLOW VELOCITY(FEET/SEC.) =  7.35
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40311.00 =   4187.00 FEET.

*************************************************************************
 FLOW PROCESS FROM NODE  40311.00 TO NODE  40312.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    353.00  DOWNSTREAM(FEET) =    337.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  712.00   CHANNEL SLOPE =  0.0225
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.968
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED            -        7.65     0.50      0.850      -
  USER-DEFINED            -        4.40     0.50      1.000      -
  USER-DEFINED            -        0.89     0.50      0.100      -
```

```
  USER-DEFINED            -        6.82     0.50      0.850      -
  USER-DEFINED            -        5.04     0.50      1.000      -
  USER-DEFINED            -        1.11     0.50      1.000      -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.885
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      37.50
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.80
 AVERAGE FLOW DEPTH(FEET) =   1.47   TRAVEL TIME(MIN.) =   2.04
 Tc(MIN.) =  22.17
 SUBAREA AREA(ACRES) =   25.91      SUBAREA RUNOFF(CFS) =  12.24
 EFFECTIVE AREA(ACRES) =     91.85    AREA-AVERAGED Fm(INCH/HR) =  0.48
 AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  0.95
 TOTAL AREA(ACRES) =      91.8       PEAK FLOW RATE(CFS) =     40.71

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.51   FLOW VELOCITY(FEET/SEC.) =  5.92
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40312.00 =   4899.00 FEET.

*************************************************************************
 FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
-------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
 MAINLINE Tc(MIN.) =  22.17
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.968
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED            -        0.04     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) =   0.04      SUBAREA RUNOFF(CFS) =   0.02
 EFFECTIVE AREA(ACRES) =     91.89   AREA-AVERAGED Fm(INCH/HR) =  0.48
 AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  0.95
 TOTAL AREA(ACRES) =      91.9       PEAK FLOW RATE(CFS) =     40.73

*************************************************************************
 FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
-------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
 MAINLINE Tc(MIN.) =  22.17
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.968
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED            -        1.17     0.50      0.850      -
  USER-DEFINED            -        0.01     0.50      1.000      -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.851
 SUBAREA AREA(ACRES) =   1.18      SUBAREA RUNOFF(CFS) =   0.58
 EFFECTIVE AREA(ACRES) =     93.07   AREA-AVERAGED Fm(INCH/HR) =  0.47
 AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  0.95
 TOTAL AREA(ACRES) =      93.1       PEAK FLOW RATE(CFS) =     41.30

*************************************************************************
 FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
-------------------------------------------------------------------------
```

```
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   22.17
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.968
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        0.18     0.50     1.000     -
  USER-DEFINED               -        4.59     0.50     1.000     -
  USER-DEFINED               -        4.27     0.50     0.850     -
  USER-DEFINED               -        3.00     0.50     1.000     -
  USER-DEFINED               -        0.16     0.50     1.000     -
  USER-DEFINED               -        0.22     0.50     0.100     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.932
  SUBAREA AREA(ACRES) =   12.42      SUBAREA RUNOFF(CFS) =    5.61
  EFFECTIVE AREA(ACRES) =    105.49   AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap = 0.95
  TOTAL AREA(ACRES) =    105.5      PEAK FLOW RATE(CFS) =    46.91

********************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   22.17
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.968
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        2.55     0.50     1.000     -
  USER-DEFINED               -       10.49     0.50     1.000     -
  USER-DEFINED               -        2.87     0.50     0.850     -
  USER-DEFINED               -        3.70     0.50     1.000     -
  USER-DEFINED               -        3.12     0.50     1.000     -
  USER-DEFINED               -        0.54     0.50     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.981
  SUBAREA AREA(ACRES) =   23.27      SUBAREA RUNOFF(CFS) =    9.99
  EFFECTIVE AREA(ACRES) =    128.76   AREA-AVERAGED Fm(INCH/HR) =  0.48
  AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap = 0.95
  TOTAL AREA(ACRES) =    128.8      PEAK FLOW RATE(CFS) =    56.90

********************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   22.17
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 0.968
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        2.13     0.50     1.000     -
  USER-DEFINED               -        0.01     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) =    2.14      SUBAREA RUNOFF(CFS) =    0.90
```

```
  EFFECTIVE AREA(ACRES) =    130.90   AREA-AVERAGED Fm(INCH/HR) =  0.48
  AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap = 0.95
  TOTAL AREA(ACRES) =     130.9      PEAK FLOW RATE(CFS) =    57.80
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     130.9  TC(MIN.) =     22.17
  EFFECTIVE AREA(ACRES) =    130.90  AREA-AVERAGED Fm(INCH/HR)=  0.48
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 0.954
  PEAK FLOW RATE(CFS)   =      57.80
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                       Michael Baker International
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                         Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY *************************
 * RMV PA-4 WATERSHED 4 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 5-YR EV MARCH 2019 CCHIU                                            *
 ************************************************************************

  FILE NAME: X40405EV.DAT
  TIME/DATE OF STUDY: 14:14 03/25/2019
================================================================================
  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  60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  40400.00 TO NODE  40401.00 IS CODE =  21
 ------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
  ELEVATION DATA: UPSTREAM(FEET) =    928.00  DOWNSTREAM(FEET) =    750.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.081
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.767
  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
  "CHAPARRAL,BROADLEAF"     -        0.75     0.50     1.000    0   8.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      0.86
  TOTAL AREA(ACRES) =       0.75   PEAK FLOW RATE(CFS) =       0.86

********************************************************************************
  FLOW PROCESS FROM NODE  40401.00 TO NODE  40402.00 IS CODE =  51
 ------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    750.00  DOWNSTREAM(FEET) =    710.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   107.00   CHANNEL SLOPE = 0.3738
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.728
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap    SCS
     LAND USE              GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED             -        1.17     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) =       1.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.09
  AVERAGE FLOW DEPTH(FEET) =  0.29    TRAVEL TIME(MIN.) =   0.29
  Tc(MIN.) =    8.37
  SUBAREA AREA(ACRES) =    1.17       SUBAREA RUNOFF(CFS) =    1.30
  EFFECTIVE AREA(ACRES) =      1.93      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       1.9          PEAK FLOW RATE(CFS) =       2.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   6.48
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40402.00 =    434.00 FEET.


**********************************************************************
  FLOW PROCESS FROM NODE  40402.00 TO NODE  40403.00 IS CODE = 51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    710.00  DOWNSTREAM(FEET) =    675.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE = 0.2756
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.683
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -         1.05     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) =       2.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.25
  AVERAGE FLOW DEPTH(FEET) =   0.38    TRAVEL TIME(MIN.) =   0.34
  Tc(MIN.) =    8.71
  SUBAREA AREA(ACRES) =    1.05       SUBAREA RUNOFF(CFS) =    1.11
  EFFECTIVE AREA(ACRES) =    2.97      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) =       3.16

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =   6.54
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40403.00 =    561.00 FEET.


**********************************************************************
  FLOW PROCESS FROM NODE  40403.00 TO NODE  40404.00 IS CODE = 51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =    650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   113.00   CHANNEL SLOPE = 0.2212
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.643
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -         1.95     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) =       4.17
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.33
  AVERAGE FLOW DEPTH(FEET) =   0.47    TRAVEL TIME(MIN.) =   0.30
  Tc(MIN.) =    9.01
  SUBAREA AREA(ACRES) =    1.95       SUBAREA RUNOFF(CFS) =    2.00
  EFFECTIVE AREA(ACRES) =    4.92      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.9         PEAK FLOW RATE(CFS) =       5.06
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  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   6.73
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40404.00 =    674.00 FEET.

**********************************************************************
  FLOW PROCESS FROM NODE  40404.00 TO NODE  40405.00 IS CODE = 51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE = 0.1826
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.567
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -         2.15     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) =       6.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.48
  AVERAGE FLOW DEPTH(FEET) =   0.56    TRAVEL TIME(MIN.) =   0.56
  Tc(MIN.) =    9.57
  SUBAREA AREA(ACRES) =    2.15       SUBAREA RUNOFF(CFS) =    2.06
  EFFECTIVE AREA(ACRES) =    7.07      AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        7.1         PEAK FLOW RATE(CFS) =       6.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   6.66
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40405.00 =    893.00 FEET.

**********************************************************************
  FLOW PROCESS FROM NODE  40405.00 TO NODE  40406.00 IS CODE = 51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =    605.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    43.00   CHANNEL SLOPE = 0.1163
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.551
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -         2.90     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) =       8.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.95
  AVERAGE FLOW DEPTH(FEET) =   0.68    TRAVEL TIME(MIN.) =   0.12
  Tc(MIN.) =    9.69
  SUBAREA AREA(ACRES) =    2.90       SUBAREA RUNOFF(CFS) =    2.74
  EFFECTIVE AREA(ACRES) =    9.97      AREA-AVERAGED Fm(INCH/HR) =   0.50
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  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.0        PEAK FLOW RATE(CFS) =        9.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.71   FLOW VELOCITY(FEET/SEC.) =   6.16
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40406.00 =     936.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40406.00 TO NODE  40407.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     605.00  DOWNSTREAM(FEET) =     602.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    52.00   CHANNEL SLOPE = 0.0577
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.528
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -       4.51     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) =      11.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.95
  AVERAGE FLOW DEPTH(FEET) =   0.88   TRAVEL TIME(MIN.) =    0.17
  Tc(MIN.) =   9.87
  SUBAREA AREA(ACRES) =      4.51        SUBAREA RUNOFF(CFS) =     4.17
  EFFECTIVE AREA(ACRES) =      14.48       AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       14.5        PEAK FLOW RATE(CFS) =       13.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.93   FLOW VELOCITY(FEET/SEC.) =   5.18
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40407.00 =     988.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40407.00 TO NODE  40408.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     602.00  DOWNSTREAM(FEET) =     559.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    533.00   CHANNEL SLOPE = 0.0807
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.429
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -       5.99     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) =      15.89
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.15
  AVERAGE FLOW DEPTH(FEET) =   0.93   TRAVEL TIME(MIN.) =    1.44
  Tc(MIN.) =   11.31
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  SUBAREA AREA(ACRES) =      5.99        SUBAREA RUNOFF(CFS) =     5.00
  EFFECTIVE AREA(ACRES) =      20.47       AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       20.5        PEAK FLOW RATE(CFS) =       17.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.96   FLOW VELOCITY(FEET/SEC.) =   6.23
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40408.00 =    1521.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40408.00 TO NODE  40409.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     559.00  DOWNSTREAM(FEET) =     509.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    702.00   CHANNEL SLOPE = 0.0712
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.310
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -       6.05     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) =      19.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.12
  AVERAGE FLOW DEPTH(FEET) =   1.03   TRAVEL TIME(MIN.) =    1.91
  Tc(MIN.) =   13.22
  SUBAREA AREA(ACRES) =      6.05        SUBAREA RUNOFF(CFS) =     4.41
  EFFECTIVE AREA(ACRES) =      26.51       AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       26.5        PEAK FLOW RATE(CFS) =       19.33

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.03   FLOW VELOCITY(FEET/SEC.) =   6.13
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40409.00 =    2223.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40409.00 TO NODE  40447.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     509.00  DOWNSTREAM(FEET) =     482.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    440.00   CHANNEL SLOPE = 0.0614
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.234
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -       6.09     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) =      21.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.94
```

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    AVERAGE FLOW DEPTH(FEET) =   1.09   TRAVEL TIME(MIN.) =   1.23
    Tc(MIN.) =   14.46
    SUBAREA AREA(ACRES) =       6.09      SUBAREA RUNOFF(CFS) =     4.02
    EFFECTIVE AREA(ACRES) =      32.60     AREA-AVERAGED Fm(INCH/HR) =  0.50
    AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        32.6        PEAK FLOW RATE(CFS) =      21.52

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.10   FLOW VELOCITY(FEET/SEC.) =  5.97
    LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =   2663.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 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.) =   14.46
    RAINFALL INTENSITY(INCH/HR) =   1.23
    AREA-AVERAGED Fm(INCH/HR) =  0.50
    AREA-AVERAGED Fp(INCH/HR) =  0.50
    AREA-AVERAGED Ap =  1.00
    EFFECTIVE STREAM AREA(ACRES) =      32.60
    TOTAL STREAM AREA(ACRES) =       32.60
    PEAK FLOW RATE(CFS) AT CONFLUENCE =       21.52

*******************************************************************************
  FLOW PROCESS FROM NODE  40410.00 TO NODE  40411.00 IS CODE =  21
-------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
    INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
    ELEVATION DATA: UPSTREAM(FEET) =   878.00  DOWNSTREAM(FEET) =   726.00

    Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
    SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   8.371
    *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.728
    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
    "CHAPARRAL,BROADLEAF"     -        0.69      0.50      1.000      0    8.37
    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) =      0.69  PEAK FLOW RATE(CFS) =       0.76

*******************************************************************************
  FLOW PROCESS FROM NODE  40411.00 TO NODE  40412.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    726.00  DOWNSTREAM(FEET) =    687.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   101.00   CHANNEL SLOPE = 0.3861
    CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
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    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
    *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.690
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED               -        0.91      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) =       1.25
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.95
    AVERAGE FLOW DEPTH(FEET) =  0.26   TRAVEL TIME(MIN.) =   0.28
    Tc(MIN.) =    8.65
    SUBAREA AREA(ACRES) =      0.91      SUBAREA RUNOFF(CFS) =    0.97
    EFFECTIVE AREA(ACRES) =       1.60      AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        1.6        PEAK FLOW RATE(CFS) =       1.71

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =  6.31
    LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40412.00 =    430.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40412.00 TO NODE  40413.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    687.00  DOWNSTREAM(FEET) =    658.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   153.00   CHANNEL SLOPE = 0.1895
    CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
    *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.624
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED               -        0.96      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) =       2.19
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.15
    AVERAGE FLOW DEPTH(FEET) =  0.38   TRAVEL TIME(MIN.) =   0.49
    Tc(MIN.) =    9.15
    SUBAREA AREA(ACRES) =      0.96      SUBAREA RUNOFF(CFS) =    0.97
    EFFECTIVE AREA(ACRES) =       2.55      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) =       2.58

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =  5.34
    LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40413.00 =    583.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40413.00 TO NODE  40414.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    658.00  DOWNSTREAM(FEET) =    615.00
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     CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.1741
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     *    5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.527
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
          LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
     USER-DEFINED             -         2.51      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) =        3.74
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.69
     AVERAGE FLOW DEPTH(FEET) =   0.47    TRAVEL TIME(MIN.) =   0.72
     Tc(MIN.) =    9.87
     SUBAREA AREA(ACRES) =     2.51       SUBAREA RUNOFF(CFS) =    2.32
     EFFECTIVE AREA(ACRES) =    5.06      AREA-AVERAGED Fm(INCH/HR) =   0.50
     AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =        5.1        PEAK FLOW RATE(CFS) =       4.68

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 0.51    FLOW VELOCITY(FEET/SEC.) =  6.03
     LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40414.00 =    830.00 FEET.

 *************************************************************************
   FLOW PROCESS FROM NODE  40414.00 TO NODE  40415.00 IS CODE = 51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
     ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    567.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =   414.00   CHANNEL SLOPE =  0.1159
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     *    5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.442
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
          LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
     USER-DEFINED             -         4.38      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) =        6.53
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.62
     AVERAGE FLOW DEPTH(FEET) =   0.62    TRAVEL TIME(MIN.) =   1.23
     Tc(MIN.) =   11.10
     SUBAREA AREA(ACRES) =     4.38       SUBAREA RUNOFF(CFS) =    3.71
     EFFECTIVE AREA(ACRES) =    9.44      AREA-AVERAGED Fm(INCH/HR) =   0.50
     AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =        9.4        PEAK FLOW RATE(CFS) =       8.00

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 0.67    FLOW VELOCITY(FEET/SEC.) =  5.86
     LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40415.00 =   1244.00 FEET.

 *************************************************************************
   FLOW PROCESS FROM NODE  40415.00 TO NODE  40416.00 IS CODE = 51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
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 ========================================================================
     ELEVATION DATA: UPSTREAM(FEET) =    567.00  DOWNSTREAM(FEET) =    538.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =   301.00   CHANNEL SLOPE =  0.0963
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     *    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             -         7.77      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) =       11.11
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.95
     AVERAGE FLOW DEPTH(FEET) =   0.79    TRAVEL TIME(MIN.) =   0.84
     Tc(MIN.) =   11.94
     SUBAREA AREA(ACRES) =     7.77       SUBAREA RUNOFF(CFS) =    6.22
     EFFECTIVE AREA(ACRES) =   17.21      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) =      13.77

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 0.85    FLOW VELOCITY(FEET/SEC.) =  6.33
     LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40416.00 =   1545.00 FEET.

 *************************************************************************
   FLOW PROCESS FROM NODE  40416.00 TO NODE  40417.00 IS CODE = 51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
     ELEVATION DATA: UPSTREAM(FEET) =    538.00  DOWNSTREAM(FEET) =    529.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =   116.00   CHANNEL SLOPE =  0.0776
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     *    5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.371
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
          LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
     USER-DEFINED             -        16.20      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) =       20.12
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.38
     AVERAGE FLOW DEPTH(FEET) =   1.03    TRAVEL TIME(MIN.) =   0.30
     Tc(MIN.) =   12.25
     SUBAREA AREA(ACRES) =    16.20       SUBAREA RUNOFF(CFS) =   12.69
     EFFECTIVE AREA(ACRES) =   33.41      AREA-AVERAGED Fm(INCH/HR) =   0.50
     AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =       33.4        PEAK FLOW RATE(CFS) =      26.17

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 1.13    FLOW VELOCITY(FEET/SEC.) =  6.81
     LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40417.00 =   1661.00 FEET.

 *************************************************************************
   FLOW PROCESS FROM NODE  40417.00 TO NODE  40447.00 IS CODE = 51
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     >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
     >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    529.00  DOWNSTREAM(FEET) =     482.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    891.00    CHANNEL SLOPE = 0.0527
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.221
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE           GROUP     (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        14.55     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) =    30.90
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.17
   AVERAGE FLOW DEPTH(FEET) =  1.29   TRAVEL TIME(MIN.) =   2.41
   Tc(MIN.) =   14.65
   SUBAREA AREA(ACRES) =    14.55      SUBAREA RUNOFF(CFS) =    9.44
   EFFECTIVE AREA(ACRES) =    47.96     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      48.0        PEAK FLOW RATE(CFS) =      31.13

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.29   FLOW VELOCITY(FEET/SEC.) =  6.20
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40447.00 =   2552.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 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.) =   14.65
   RAINFALL INTENSITY(INCH/HR) =   1.22
   AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =      47.96
   TOTAL STREAM AREA(ACRES) =      47.96
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      31.13

   ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity  Fp(Fm)      Ap     Ae    HEADWATER
   NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1      21.52  14.46   1.234   0.50( 0.50) 1.00    32.6   40400.00
     2      31.13  14.65   1.221   0.50( 0.50) 1.00    48.0   40410.00

   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      52.65  14.46   1.234   0.50( 0.50) 1.00    79.9   40400.00
     2      52.29  14.65   1.221   0.50( 0.50) 1.00    80.6   40410.00
```

```
   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      52.65    Tc(MIN.) =    14.46
   EFFECTIVE AREA(ACRES) =      79.91    AREA-AVERAGED Fm(INCH/HR) = 0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =       80.6
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =   2663.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE = 10
-----------------------------------------------------------------------------
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
=============================================================================

*****************************************************************************
   FLOW PROCESS FROM NODE  40420.00 TO NODE  40421.00 IS CODE = 21
-----------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
   ELEVATION DATA: UPSTREAM(FEET) =    925.00  DOWNSTREAM(FEET) =     815.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.799
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.671
   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
   "CHAPARRAL,BROADLEAF"     -         0.31     0.50     1.000     0   8.80
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =     0.32
   TOTAL AREA(ACRES) =       0.31   PEAK FLOW RATE(CFS) =      0.32

*****************************************************************************
   FLOW PROCESS FROM NODE  40421.00 TO NODE  40422.00 IS CODE = 51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    815.00  DOWNSTREAM(FEET) =     743.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    123.00    CHANNEL SLOPE = 0.5854
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.619
   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     -
   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) =     0.47
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.30
   AVERAGE FLOW DEPTH(FEET) =  0.17   TRAVEL TIME(MIN.) =   0.39
   Tc(MIN.) =    9.19
   SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     0.30
```

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   EFFECTIVE AREA(ACRES) =      0.60     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       0.61

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.19   FLOW VELOCITY(FEET/SEC.) =   5.74
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40422.00 =    444.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40422.00 TO NODE  40423.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    743.00 DOWNSTREAM(FEET) =    665.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   142.00   CHANNEL SLOPE = 0.5493
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.568
   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     -
   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) =        0.99
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.17
   AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   0.38
   Tc(MIN.) =   9.57
   SUBAREA AREA(ACRES) =     0.80      SUBAREA RUNOFF(CFS) =    0.77
   EFFECTIVE AREA(ACRES) =      1.40     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       1.35

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.26   FLOW VELOCITY(FEET/SEC.) =   6.84
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40423.00 =    586.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40423.00 TO NODE  40424.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    665.00 DOWNSTREAM(FEET) =    630.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    99.00   CHANNEL SLOPE = 0.3535
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.530
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        0.32     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) =        1.50
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.82
   AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   0.28
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   Tc(MIN.) =   9.85
   SUBAREA AREA(ACRES) =     0.32      SUBAREA RUNOFF(CFS) =    0.30
   EFFECTIVE AREA(ACRES) =      1.72     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       1.60

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.30   FLOW VELOCITY(FEET/SEC.) =   5.90
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40424.00 =    685.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40424.00 TO NODE  40425.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    630.00 DOWNSTREAM(FEET) =    615.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    35.00   CHANNEL SLOPE = 0.4286
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.519
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        1.87     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) =        2.45
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.13
   AVERAGE FLOW DEPTH(FEET) =   0.34   TRAVEL TIME(MIN.) =   0.08
   Tc(MIN.) =   9.93
   SUBAREA AREA(ACRES) =     1.87      SUBAREA RUNOFF(CFS) =    1.71
   EFFECTIVE AREA(ACRES) =      3.59     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) =       3.29

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.38   FLOW VELOCITY(FEET/SEC.) =   7.73
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40425.00 =    720.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40425.00 TO NODE  40426.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    615.00 DOWNSTREAM(FEET) =    574.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   260.00   CHANNEL SLOPE = 0.1577
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  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             -        1.19     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) =        3.81
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```
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.56
    AVERAGE FLOW DEPTH(FEET) =   0.48    TRAVEL TIME(MIN.) =   0.78
    Tc(MIN.) =   10.71
    SUBAREA AREA(ACRES) =      1.19      SUBAREA RUNOFF(CFS) =    1.03
    EFFECTIVE AREA(ACRES) =       4.78      AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        4.8         PEAK FLOW RATE(CFS) =        4.15

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.50    FLOW VELOCITY(FEET/SEC.) =  5.57
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40426.00 =    980.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40426.00 TO NODE  40427.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =     533.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   322.00   CHANNEL SLOPE = 0.1273
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.405
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL      AREA        Fp        Ap      SCS
          LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED               -          1.82       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) =      4.89
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.46
    AVERAGE FLOW DEPTH(FEET) =   0.55    TRAVEL TIME(MIN.) =   0.98
    Tc(MIN.) =   11.70
    SUBAREA AREA(ACRES) =      1.82      SUBAREA RUNOFF(CFS) =    1.48
    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) =        5.37

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.57    FLOW VELOCITY(FEET/SEC.) =  5.52
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40427.00 =   1302.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40427.00 TO NODE  40428.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    533.00  DOWNSTREAM(FEET) =     521.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE = 0.0750
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.372
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL      AREA        Fp        Ap      SCS
          LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED               -          6.79       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) =        8.04
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.03
    AVERAGE FLOW DEPTH(FEET) =   0.73    TRAVEL TIME(MIN.) =   0.53
    Tc(MIN.) =   12.23
    SUBAREA AREA(ACRES) =      6.79      SUBAREA RUNOFF(CFS) =    5.33
    EFFECTIVE AREA(ACRES) =      13.39      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) =       10.50

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.81    FLOW VELOCITY(FEET/SEC.) =  5.39
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40428.00 =   1462.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40428.00 TO NODE  40429.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    521.00  DOWNSTREAM(FEET) =     508.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   221.00   CHANNEL SLOPE = 0.0588
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.327
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL      AREA        Fp        Ap      SCS
          LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED               -          3.74       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) =       11.90
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.03
    AVERAGE FLOW DEPTH(FEET) =   0.89    TRAVEL TIME(MIN.) =   0.73
    Tc(MIN.) =   12.96
    SUBAREA AREA(ACRES) =      3.74      SUBAREA RUNOFF(CFS) =    2.78
    EFFECTIVE AREA(ACRES) =      17.13      AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =       17.1         PEAK FLOW RATE(CFS) =       12.74

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.91    FLOW VELOCITY(FEET/SEC.) =  5.12
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40429.00 =   1683.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40429.00 TO NODE  40446.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    508.00  DOWNSTREAM(FEET) =     489.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   306.00   CHANNEL SLOPE = 0.0621
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.266
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL      AREA        Fp        Ap      SCS
          LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
```

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    USER-DEFINED           -          0.99       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) =      13.08
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    5.26
 AVERAGE FLOW DEPTH(FEET) =  0.91    TRAVEL TIME(MIN.) =   0.97
 Tc(MIN.) =   13.93
 SUBAREA AREA(ACRES) =      0.99      SUBAREA RUNOFF(CFS) =    0.68
 EFFECTIVE AREA(ACRES) =     18.12      AREA-AVERAGED Fm(INCH/HR) =   0.50
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      18.1         PEAK FLOW RATE(CFS) =      12.74
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.90   FLOW VELOCITY(FEET/SEC.) =   5.27
 LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =    1989.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE = 10
 -------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
 =========================================================================

***************************************************************************
  FLOW PROCESS FROM NODE  40430.00 TO NODE  40431.00 IS CODE = 21
 -------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  302.00
  ELEVATION DATA: UPSTREAM(FEET) =   1035.00  DOWNSTREAM(FEET) =    875.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.870
  *    5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.795
  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
  "CHAPARRAL,BROADLEAF"    -         0.40      0.50      1.000     0    7.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     0.47
  TOTAL AREA(ACRES) =      0.40    PEAK FLOW RATE(CFS) =       0.47

***************************************************************************
  FLOW PROCESS FROM NODE  40431.00 TO NODE  40432.00 IS CODE = 51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    875.00  DOWNSTREAM(FEET) =    800.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  160.00   CHANNEL SLOPE = 0.4688
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *    5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.734
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
```

```
        LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED            -          0.65      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) =       0.83
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    5.80
 AVERAGE FLOW DEPTH(FEET) =  0.22    TRAVEL TIME(MIN.) =   0.46
 Tc(MIN.) =    8.33
 SUBAREA AREA(ACRES) =      0.65      SUBAREA RUNOFF(CFS) =    0.72
 EFFECTIVE AREA(ACRES) =      1.05      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) =       1.17

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   6.28
 LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40432.00 =     462.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40432.00 TO NODE  40433.00 IS CODE = 51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    712.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  150.00   CHANNEL SLOPE = 0.5867
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *    5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.689
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED            -          1.08      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) =       1.75
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    7.46
 AVERAGE FLOW DEPTH(FEET) =  0.28    TRAVEL TIME(MIN.) =   0.34
 Tc(MIN.) =    8.67
 SUBAREA AREA(ACRES) =      1.08      SUBAREA RUNOFF(CFS) =    1.16
 EFFECTIVE AREA(ACRES) =      2.13      AREA-AVERAGED Fm(INCH/HR) =   0.50
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       2.1         PEAK FLOW RATE(CFS) =       2.28

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   7.92
 LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40433.00 =     612.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40433.00 TO NODE  40434.00 IS CODE = 51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    712.00  DOWNSTREAM(FEET) =    657.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  120.00   CHANNEL SLOPE = 0.4583
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *    5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.655
```

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 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED              -       1.98     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) =       3.31
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.02
 AVERAGE FLOW DEPTH(FEET) =  0.37   TRAVEL TIME(MIN.) =   0.25
 Tc(MIN.) =    8.91
 SUBAREA AREA(ACRES) =    1.98      SUBAREA RUNOFF(CFS) =    2.06
 EFFECTIVE AREA(ACRES) =      4.11     AREA-AVERAGED Fm(INCH/HR) =   0.50
 AREA-AVERAGED Fp(INCH/HR) =   0.50 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       4.1        PEAK FLOW RATE(CFS) =       4.28

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.41   FLOW VELOCITY(FEET/SEC.) =  8.52
 LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40434.00 =     732.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40434.00 TO NODE  40435.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     657.00 DOWNSTREAM(FEET) =     620.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   161.00   CHANNEL SLOPE =  0.2298
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.603
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       2.34     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) =       5.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.86
  AVERAGE FLOW DEPTH(FEET) =  0.51   TRAVEL TIME(MIN.) =   0.39
  Tc(MIN.) =    9.31
  SUBAREA AREA(ACRES) =    2.34      SUBAREA RUNOFF(CFS) =    2.32
  EFFECTIVE AREA(ACRES) =      6.46     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) =       6.41

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =  7.20
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40435.00 =     893.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40435.00 TO NODE  40445.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     620.00 DOWNSTREAM(FEET) =     579.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   358.00   CHANNEL SLOPE =  0.1145
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
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  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.489
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       1.75     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) =       7.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.75
  AVERAGE FLOW DEPTH(FEET) =  0.65   TRAVEL TIME(MIN.) =   1.04
  Tc(MIN.) =   10.34
  SUBAREA AREA(ACRES) =    1.75      SUBAREA RUNOFF(CFS) =    1.56
  EFFECTIVE AREA(ACRES) =      8.21     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       8.2        PEAK FLOW RATE(CFS) =       7.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.65   FLOW VELOCITY(FEET/SEC.) =  5.74
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40445.00 =    1251.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40445.00 TO NODE  40445.00 IS CODE =  1
-------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=========================================================================
  TOTAL NUMBER OF STREAMS = 2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.34
  RAINFALL INTENSITY(INCH/HR) =   1.49
  AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50
  AREA-AVERAGED Ap =   1.00
  EFFECTIVE STREAM AREA(ACRES) =        8.21
  TOTAL STREAM AREA(ACRES) =        8.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.30

*************************************************************************
  FLOW PROCESS FROM NODE  40440.00 TO NODE  40441.00 IS CODE = 21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   319.00
  ELEVATION DATA: UPSTREAM(FEET) =    1020.00  DOWNSTREAM(FEET) =     898.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.699
  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
  "CHAPARRAL,BROADLEAF"     -       0.75     0.50     1.000     0   8.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.81
  TOTAL AREA(ACRES) =       0.75   PEAK FLOW RATE(CFS) =       0.81
```

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*************************************************************************
   FLOW PROCESS FROM NODE  40441.00 TO NODE  40442.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    898.00  DOWNSTREAM(FEET) =    760.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  253.00   CHANNEL SLOPE = 0.5455
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.616
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         0.89      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) =       1.25
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.75
   AVERAGE FLOW DEPTH(FEET) =  0.25   TRAVEL TIME(MIN.) =   0.62
   Tc(MIN.) =    9.21
   SUBAREA AREA(ACRES) =     0.89      SUBAREA RUNOFF(CFS) =    0.89
   EFFECTIVE AREA(ACRES) =      1.64    AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        1.6        PEAK FLOW RATE(CFS) =      1.64

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =  7.12
   LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40442.00 =    572.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40442.00 TO NODE  40443.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    760.00  DOWNSTREAM(FEET) =    653.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  188.00   CHANNEL SLOPE = 0.5691
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.563
   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) =       2.51
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.00
   AVERAGE FLOW DEPTH(FEET) =  0.32   TRAVEL TIME(MIN.) =   0.39
   Tc(MIN.) =    9.60
   SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =    1.73
   EFFECTIVE AREA(ACRES) =      3.44    AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =      3.29

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

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   DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =  8.67
   LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40443.00 =    760.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40443.00 TO NODE  40444.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    653.00  DOWNSTREAM(FEET) =    605.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  198.00   CHANNEL SLOPE = 0.2424
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -         3.16      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) =       4.72
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.89
   AVERAGE FLOW DEPTH(FEET) =  0.48   TRAVEL TIME(MIN.) =   0.48
   Tc(MIN.) =   10.08
   SUBAREA AREA(ACRES) =     3.16      SUBAREA RUNOFF(CFS) =    2.85
   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) =      5.97

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =  7.26
   LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40444.00 =    958.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40444.00 TO NODE  40445.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    579.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  243.00   CHANNEL SLOPE = 0.1070
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.459
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         1.67      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) =       6.69
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.48
   AVERAGE FLOW DEPTH(FEET) =  0.64   TRAVEL TIME(MIN.) =   0.74
   Tc(MIN.) =   10.82
   SUBAREA AREA(ACRES) =     1.67      SUBAREA RUNOFF(CFS) =    1.45
   EFFECTIVE AREA(ACRES) =      8.27    AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        8.3        PEAK FLOW RATE(CFS) =      7.14
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END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.65    FLOW VELOCITY(FEET/SEC.) =    5.58
LONGEST FLOWPATH FROM NODE 40440.00 TO NODE 40445.00 =    1201.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40445.00 TO NODE  40445.00 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.) =   10.82
  RAINFALL INTENSITY(INCH/HR) =    1.46
  AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50
  AREA-AVERAGED Ap = 1.00
  EFFECTIVE STREAM AREA(ACRES) =        8.27
  TOTAL STREAM AREA(ACRES) =        8.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =        7.14

  ** CONFLUENCE DATA **
  STREAM      Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
    1       7.30    10.34    1.489   0.50( 0.50) 1.00       8.2    40430.00
    2       7.14    10.82    1.459   0.50( 0.50) 1.00       8.3    40440.00

  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      14.34    10.34    1.489   0.50( 0.50) 1.00      16.1    40430.00
    2      14.23    10.82    1.459   0.50( 0.50) 1.00      16.5    40440.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      14.34    Tc(MIN.) =    10.34
  EFFECTIVE AREA(ACRES) =      16.12   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      16.5
  LONGEST FLOWPATH FROM NODE 40430.00 TO NODE 40445.00 =    1251.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40445.00 TO NODE  40446.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    579.00  DOWNSTREAM(FEET) =     489.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   636.00   CHANNEL SLOPE = 0.1415
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.402
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
```

```
  USER-DEFINED            -        3.79      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) =      15.88
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.56
  AVERAGE FLOW DEPTH(FEET) =   0.84   TRAVEL TIME(MIN.) =   1.40
  Tc(MIN.) =   11.74
  SUBAREA AREA(ACRES) =      3.79      SUBAREA RUNOFF(CFS) =    3.07
  EFFECTIVE AREA(ACRES) =     19.90      AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =     20.3        PEAK FLOW RATE(CFS) =      16.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.84    FLOW VELOCITY(FEET/SEC.) =   7.59
  LONGEST FLOWPATH FROM NODE 40430.00 TO NODE 40446.00 =    1887.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE =  11
-------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
===============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM      Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
    1      16.15    11.74    1.402   0.50( 0.50) 1.00      19.9    40430.00
    2      15.90    12.23    1.372   0.50( 0.50) 1.00      20.3    40440.00
  LONGEST FLOWPATH FROM NODE 40430.00 TO NODE 40446.00 =    1887.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM      Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
    1      12.74    13.93    1.266   0.50( 0.50) 1.00      18.1    40420.00
  LONGEST FLOWPATH FROM NODE 40420.00 TO NODE 40446.00 =    1989.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM      Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
    1      28.79    11.74    1.402   0.50( 0.50) 1.00      35.2    40430.00
    2      28.62    12.23    1.372   0.50( 0.50) 1.00      36.2    40440.00
    3      26.72    13.93    1.266   0.50( 0.50) 1.00      38.4    40420.00
   TOTAL AREA(ACRES) =       38.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      28.79   Tc(MIN.) =   11.745
  EFFECTIVE AREA(ACRES) =     35.18   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      38.4
  LONGEST FLOWPATH FROM NODE 40420.00 TO NODE 40446.00 =    1989.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE =  12
-------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
===============================================================================

*************************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40447.00 IS CODE =  51
```

```
 -------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    489.00  DOWNSTREAM(FEET) =    482.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  167.00   CHANNEL SLOPE = 0.0419
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.371
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         0.59      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) =     29.02
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.58
   AVERAGE FLOW DEPTH(FEET) =  1.32   TRAVEL TIME(MIN.) =   0.50
   Tc(MIN.) =  12.24
   SUBAREA AREA(ACRES) =     0.59      SUBAREA RUNOFF(CFS) =    0.46
   EFFECTIVE AREA(ACRES) =    35.77      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      39.0        PEAK FLOW RATE(CFS) =     28.79
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.32   FLOW VELOCITY(FEET/SEC.) =  5.55
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40447.00 =   2156.00 FEET.

 *******************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE =  11
 -------------------------------------------------------------------------------
   >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
 ===============================================================================

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM     Q      Tc   Intensity  Fp(Fm)     Ap      Ae    HEADWATER
   NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
      1     28.79  12.24   1.371   0.50( 0.50) 1.00     35.8   40430.00
      2     28.62  12.73   1.341   0.50( 0.50) 1.00     36.8   40440.00
      3     26.72  14.44   1.235   0.50( 0.50) 1.00     39.0   40420.00
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40447.00 =   2156.00 FEET.

   ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM     Q      Tc   Intensity  Fp(Fm)     Ap      Ae    HEADWATER
   NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
      1     52.65  14.46   1.234   0.50( 0.50) 1.00     79.9   40400.00
      2     52.29  14.65   1.221   0.50( 0.50) 1.00     80.6   40410.00
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =   2663.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM     Q      Tc   Intensity  Fp(Fm)     Ap      Ae    HEADWATER
   NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
      1     81.44  12.24   1.371   0.50( 0.50) 1.00    103.5   40430.00
      2     81.27  12.73   1.341   0.50( 0.50) 1.00    107.1   40440.00
      3     79.37  14.44   1.235   0.50( 0.50) 1.00    118.8   40420.00
      4     79.33  14.46   1.234   0.50( 0.50) 1.00    118.9   40400.00
      5     78.53  14.65   1.221   0.50( 0.50) 1.00    119.5   40410.00
```

```
     TOTAL AREA(ACRES) =      119.5

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =       81.44  Tc(MIN.) =  12.244
   EFFECTIVE AREA(ACRES) =   103.45  AREA-AVERAGED Fm(INCH/HR) = 0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =      119.5
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =   2663.00 FEET.

 *******************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE =  12
 -------------------------------------------------------------------------------
   >>>>>CLEAR MEMORY BANK # 1 <<<<<
 ===============================================================================

 *******************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40448.00 IS CODE =  51
 -------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    482.00  DOWNSTREAM(FEET) =    447.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  926.00   CHANNEL SLOPE = 0.0378
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.236
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        24.32      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) =     89.50
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.10
   AVERAGE FLOW DEPTH(FEET) =  2.05   TRAVEL TIME(MIN.) =   2.17
   Tc(MIN.) =  14.42
   SUBAREA AREA(ACRES) =    24.32      SUBAREA RUNOFF(CFS) =   16.11
   EFFECTIVE AREA(ACRES) =   127.77      AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      143.9        PEAK FLOW RATE(CFS) =     84.63

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.01   FLOW VELOCITY(FEET/SEC.) =  6.99
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40448.00 =   3589.00 FEET.

 *******************************************************************************
   FLOW PROCESS FROM NODE  40448.00 TO NODE  40449.00 IS CODE =  51
 -------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =    433.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  443.00   CHANNEL SLOPE = 0.0316
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.184
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
```

```
         LAND USE             GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED                  -     108.49    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) =     118.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.11
  AVERAGE FLOW DEPTH(FEET) =  2.35   TRAVEL TIME(MIN.) =  1.04
  Tc(MIN.) =  15.46
  SUBAREA AREA(ACRES) =  108.49      SUBAREA RUNOFF(CFS) =  66.73
  EFFECTIVE AREA(ACRES) =    236.26    AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =    252.3       PEAK FLOW RATE(CFS) =    145.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.54   FLOW VELOCITY(FEET/SEC.) =  7.49
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40449.00 =   4032.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40449.00 TO NODE  40450.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    433.00 DOWNSTREAM(FEET) =    398.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1065.00   CHANNEL SLOPE = 0.0329
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 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                  -      36.85    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) =     155.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.72
  AVERAGE FLOW DEPTH(FEET) =  2.59   TRAVEL TIME(MIN.) =  2.30
  Tc(MIN.) =  17.75
  SUBAREA AREA(ACRES) =   36.85      SUBAREA RUNOFF(CFS) =  19.92
  EFFECTIVE AREA(ACRES) =    273.10    AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =    289.2       PEAK FLOW RATE(CFS) =    147.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.54   FLOW VELOCITY(FEET/SEC.) =  7.64
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40450.00 =   5097.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40450.00 TO NODE  40451.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    398.00 DOWNSTREAM(FEET) =    386.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  401.00   CHANNEL SLOPE = 0.0299
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.069
```

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  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
         LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED                  -      71.80    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) =     166.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.57
  AVERAGE FLOW DEPTH(FEET) =  2.70   TRAVEL TIME(MIN.) =  0.88
  Tc(MIN.) =  18.64
  SUBAREA AREA(ACRES) =   71.80      SUBAREA RUNOFF(CFS) =  36.76
  EFFECTIVE AREA(ACRES) =    344.91    AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =    361.0       PEAK FLOW RATE(CFS) =    176.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.76   FLOW VELOCITY(FEET/SEC.) =  7.70
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40451.00 =   5498.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40451.00 TO NODE  40452.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    386.00 DOWNSTREAM(FEET) =    358.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  957.00   CHANNEL SLOPE = 0.0293
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.012
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
         LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED                  -      12.07    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) =     179.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.51
  AVERAGE FLOW DEPTH(FEET) =  2.51   TRAVEL TIME(MIN.) =  1.68
  Tc(MIN.) =  20.31
  SUBAREA AREA(ACRES) =   12.07      SUBAREA RUNOFF(CFS) =   5.57
  EFFECTIVE AREA(ACRES) =    356.98    AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =    373.1       PEAK FLOW RATE(CFS) =    176.58
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.49   FLOW VELOCITY(FEET/SEC.) =  9.48
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40452.00 =   6455.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40452.00 TO NODE  40453.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    358.00 DOWNSTREAM(FEET) =    341.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  429.00   CHANNEL SLOPE = 0.0396
```

```
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.996
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp         Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED             -        0.27     0.50      0.500     -
    USER-DEFINED             -        1.96     0.50      1.000     -
    USER-DEFINED             -        0.96     0.50      1.000     -
    USER-DEFINED             -        0.38     0.50      1.000     -
    USER-DEFINED             -        0.18     0.50      1.000     -
    USER-DEFINED             -        1.69     0.50      1.000     -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.975
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    177.83
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.64
    AVERAGE FLOW DEPTH(FEET) =   2.36   TRAVEL TIME(MIN.) =   0.67
    Tc(MIN.) =  20.99
    SUBAREA AREA(ACRES) =    5.44       SUBAREA RUNOFF(CFS) =    2.49
    EFFECTIVE AREA(ACRES) =   362.42     AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =      378.5       PEAK FLOW RATE(CFS) =    176.58
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 2.35   FLOW VELOCITY(FEET/SEC.) = 10.62
    LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40453.00 =   6884.00 FEET.

****************************************************************************
    FLOW PROCESS FROM NODE  40453.00 TO NODE  40453.00 IS CODE =  81
--------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    MAINLINE Tc(MIN.) =   20.99
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.996
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp         Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED             -        0.18     0.50      1.000     -
    USER-DEFINED             -        5.30     0.50      0.850     -
    USER-DEFINED             -        0.64     0.50      1.000     -
    USER-DEFINED             -        2.08     0.50      1.000     -
    USER-DEFINED             -        0.67     0.50      0.100     -
    USER-DEFINED             -        0.29     0.50      1.000     -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.847
    SUBAREA AREA(ACRES) =    9.16       SUBAREA RUNOFF(CFS) =    4.72
    EFFECTIVE AREA(ACRES) =   371.58     AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =      387.7       PEAK FLOW RATE(CFS) =    176.58
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
    FLOW PROCESS FROM NODE  40453.00 TO NODE  40450.00 IS CODE =  81
--------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    MAINLINE Tc(MIN.) =   20.99
```

```
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.996
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp         Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED             -        0.03     0.50      1.000     -
    USER-DEFINED             -        4.59     0.50      0.850     -
    USER-DEFINED             -        0.01     0.50      1.000     -
    USER-DEFINED             -        0.51     0.50      1.000     -
    USER-DEFINED             -        0.73     0.50      1.000     -
    USER-DEFINED             -        0.16     0.50      1.000     -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.886
    SUBAREA AREA(ACRES) =    6.03       SUBAREA RUNOFF(CFS) =    3.00
    EFFECTIVE AREA(ACRES) =   377.61     AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   0.99
    TOTAL AREA(ACRES) =      393.7       PEAK FLOW RATE(CFS) =    176.58
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
    FLOW PROCESS FROM NODE  40453.00 TO NODE  40453.00 IS CODE =  81
--------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
    MAINLINE Tc(MIN.) =   20.99
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.996
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp         Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED             -        0.37     0.50      1.000     -
    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) =    0.87       SUBAREA RUNOFF(CFS) =    0.39
    EFFECTIVE AREA(ACRES) =   378.48     AREA-AVERAGED Fm(INCH/HR) =   0.50
    AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   0.99
    TOTAL AREA(ACRES) =      394.6       PEAK FLOW RATE(CFS) =    176.58
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
==========================================================================
    END OF STUDY SUMMARY:
    TOTAL AREA(ACRES)      =     394.6  TC(MIN.) =     20.99
    EFFECTIVE AREA(ACRES) =    378.48  AREA-AVERAGED Fm(INCH/HR)=  0.50
    AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 0.994
    PEAK FLOW RATE(CFS)    =     176.58

    ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc    Intensity  Fp(Fm)      Ap     Ae     HEADWATER
    NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
       1     176.58  20.99   0.996   0.50( 0.50) 0.99    378.5   40430.00
       2     172.73  21.50   0.984   0.50( 0.50) 0.99    382.2   40440.00
       3     161.33  23.33   0.940   0.50( 0.50) 0.99    393.8   40420.00
       4     161.21  23.35   0.940   0.50( 0.50) 0.99    393.9   40400.00
       5     159.83  23.57   0.934   0.50( 0.50) 0.99    394.6   40410.00
==========================================================================
==========================================================================
    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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                       Analysis prepared by:

                    Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-4 WATERSHED 5 EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 5-YR EV MARCH 2019 CCHIU                                              *
 ************************************************************************

  FILE NAME: X40505EV.DAT
  TIME/DATE OF STUDY: 14:18 03/25/2019
==========================================================================
   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  60.0     30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0     25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0     20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0     15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0     10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40500.00 TO NODE  40501.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   328.00
  ELEVATION DATA: UPSTREAM(FEET) =    961.00  DOWNSTREAM(FEET) =   845.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.819
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.668
  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
  "CHAPARRAL,BROADLEAF"      -       0.63     0.50    1.000     0    8.82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      0.66
  TOTAL AREA(ACRES) =       0.63   PEAK FLOW RATE(CFS) =       0.66


****************************************************************************
  FLOW PROCESS FROM NODE  40501.00 TO NODE  40502.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    845.00  DOWNSTREAM(FEET) =    788.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   141.00    CHANNEL SLOPE = 0.4043
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.615
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp       Ap     SCS
      LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -       1.11     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) =        1.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.91
  AVERAGE FLOW DEPTH(FEET) =  0.26    TRAVEL TIME(MIN.) =   0.40
  Tc(MIN.) =    9.22
  SUBAREA AREA(ACRES) =    1.11       SUBAREA RUNOFF(CFS) =    1.11
  EFFECTIVE AREA(ACRES) =     1.74     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.7          PEAK FLOW RATE(CFS) =       1.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
 DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =   6.45
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40502.00 =    469.00 FEET.


*************************************************************************
 FLOW PROCESS FROM NODE  40502.00 TO NODE  40503.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    788.00  DOWNSTREAM(FEET) =    719.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE = 0.3690
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.553
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap     SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED            -         1.44     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) =       2.43
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.76
 AVERAGE FLOW DEPTH(FEET) =   0.35   TRAVEL TIME(MIN.) =   0.46
 Tc(MIN.) =    9.68
 SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    1.36
 EFFECTIVE AREA(ACRES) =    3.18     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) =      3.01

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.38   FLOW VELOCITY(FEET/SEC.) =   7.08
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40503.00 =    656.00 FEET.


*************************************************************************
 FLOW PROCESS FROM NODE  40503.00 TO NODE  40504.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    719.00  DOWNSTREAM(FEET) =    545.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   302.00   CHANNEL SLOPE = 0.5762
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.497
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap     SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED            -         3.36     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) =       4.52
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.35
 AVERAGE FLOW DEPTH(FEET) =   0.40   TRAVEL TIME(MIN.) =   0.54
 Tc(MIN.) =   10.22
 SUBAREA AREA(ACRES) =    3.36      SUBAREA RUNOFF(CFS) =    3.01
 EFFECTIVE AREA(ACRES) =    6.54     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) =      5.86
```

```
 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =   9.86
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40504.00 =    958.00 FEET.

*************************************************************************
 FLOW PROCESS FROM NODE  40504.00 TO NODE  40505.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    470.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   328.00   CHANNEL SLOPE = 0.2287
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.454
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap     SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED            -         9.58     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) =       9.98
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.03
 AVERAGE FLOW DEPTH(FEET) =   0.64   TRAVEL TIME(MIN.) =   0.68
 Tc(MIN.) =   10.90
 SUBAREA AREA(ACRES) =    9.58      SUBAREA RUNOFF(CFS) =    8.23
 EFFECTIVE AREA(ACRES) =   16.12     AREA-AVERAGED Fm(INCH/HR) =   0.50
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      16.1        PEAK FLOW RATE(CFS) =     13.84

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.73   FLOW VELOCITY(FEET/SEC.) =   8.71
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40505.00 =   1286.00 FEET.

*************************************************************************
 FLOW PROCESS FROM NODE  40505.00 TO NODE  40506.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    410.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   507.00   CHANNEL SLOPE = 0.1183
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.383
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap     SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED            -        10.98     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) =      18.21
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.32
 AVERAGE FLOW DEPTH(FEET) =   0.91   TRAVEL TIME(MIN.) =   1.15
 Tc(MIN.) =   12.05
 SUBAREA AREA(ACRES) =   10.98      SUBAREA RUNOFF(CFS) =    8.72
 EFFECTIVE AREA(ACRES) =   27.10     AREA-AVERAGED Fm(INCH/HR) =   0.50
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      27.1        PEAK FLOW RATE(CFS) =      21.53

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.97   FLOW VELOCITY(FEET/SEC.) =   7.60
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40506.00 =   1793.00 FEET.

*************************************************************************
 FLOW PROCESS FROM NODE  40506.00 TO NODE  40507.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     410.00  DOWNSTREAM(FEET) =     355.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    698.00   CHANNEL SLOPE = 0.0788
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.275
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap       SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        4.53       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) =      23.11
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.69
 AVERAGE FLOW DEPTH(FEET) =   1.07   TRAVEL TIME(MIN.) =   1.74
 Tc(MIN.) =   13.79
 SUBAREA AREA(ACRES) =      4.53        SUBAREA RUNOFF(CFS) =      3.16
 EFFECTIVE AREA(ACRES) =     31.63      AREA-AVERAGED Fm(INCH/HR) =   0.50
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      31.6        PEAK FLOW RATE(CFS) =      22.06

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.06   FLOW VELOCITY(FEET/SEC.) =   6.57
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40507.00 =   2491.00 FEET.

*************************************************************************
 FLOW PROCESS FROM NODE  40507.00 TO NODE  40518.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     355.00  DOWNSTREAM(FEET) =     341.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    604.00   CHANNEL SLOPE = 0.0232
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
 *   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               -        9.02       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) =      24.80
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.32
 AVERAGE FLOW DEPTH(FEET) =   1.25   TRAVEL TIME(MIN.) =   1.89
 Tc(MIN.) =   15.68
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```
 SUBAREA AREA(ACRES) =       9.02       SUBAREA RUNOFF(CFS) =      5.48
 EFFECTIVE AREA(ACRES) =     40.66      AREA-AVERAGED Fm(INCH/HR) =   0.50
 AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      40.7        PEAK FLOW RATE(CFS) =      24.71

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.25   FLOW VELOCITY(FEET/SEC.) =   5.30
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40518.00 =   3095.00 FEET.

*************************************************************************
 FLOW PROCESS FROM NODE  40518.00 TO NODE  40518.00 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.) =   15.68
 RAINFALL INTENSITY(INCH/HR) =    1.18
 AREA-AVERAGED Fm(INCH/HR) =  0.50
 AREA-AVERAGED Fp(INCH/HR) =  0.50
 AREA-AVERAGED Ap = 1.00
 EFFECTIVE STREAM AREA(ACRES) =      40.66
 TOTAL STREAM AREA(ACRES) =      40.66
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      24.71

*************************************************************************
 FLOW PROCESS FROM NODE  40510.00 TO NODE  40511.00 IS CODE = 21
-------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=========================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
 ELEVATION DATA: UPSTREAM(FEET) =     851.00  DOWNSTREAM(FEET) =     735.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.835
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.666
 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
 "CHAPARRAL,BROADLEAF"      -        0.48      0.50     1.000     0    8.84
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) =       0.50
 TOTAL AREA(ACRES) =       0.48  PEAK FLOW RATE(CFS) =        0.50

*************************************************************************
 FLOW PROCESS FROM NODE  40511.00 TO NODE  40512.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     735.00  DOWNSTREAM(FEET) =     650.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    116.00   CHANNEL SLOPE = 0.7328
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.627
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  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
       LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        0.73     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) =      0.87
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.64
  AVERAGE FLOW DEPTH(FEET) =  0.21   TRAVEL TIME(MIN.) =  0.29
  Tc(MIN.) =    9.13
  SUBAREA AREA(ACRES) =     0.73       SUBAREA RUNOFF(CFS) =   0.74
  EFFECTIVE AREA(ACRES) =     1.20     AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.2       PEAK FLOW RATE(CFS) =      1.22

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   FLOW VELOCITY(FEET/SEC.) =  7.44
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40512.00 =    445.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40512.00 TO NODE  40513.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    581.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  152.00   CHANNEL SLOPE = 0.4539
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.577
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
       LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        1.36     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) =      1.88
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.85
  AVERAGE FLOW DEPTH(FEET) =  0.30   TRAVEL TIME(MIN.) =  0.37
  Tc(MIN.) =    9.50
  SUBAREA AREA(ACRES) =     1.36       SUBAREA RUNOFF(CFS) =   1.32
  EFFECTIVE AREA(ACRES) =     2.56     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) =      2.48

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   FLOW VELOCITY(FEET/SEC.) =  7.47
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40513.00 =    597.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40513.00 TO NODE  40514.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    581.00  DOWNSTREAM(FEET) =    500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE = 0.4629
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
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  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.529
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
       LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        2.32     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) =      3.56
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.02
  AVERAGE FLOW DEPTH(FEET) =  0.38   TRAVEL TIME(MIN.) =  0.36
  Tc(MIN.) =    9.86
  SUBAREA AREA(ACRES) =     2.32       SUBAREA RUNOFF(CFS) =   2.14
  EFFECTIVE AREA(ACRES) =     4.88     AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      4.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   FLOW VELOCITY(FEET/SEC.) =  8.66
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40514.00 =    772.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40514.00 TO NODE  40515.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    440.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  206.00   CHANNEL SLOPE = 0.2913
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.491
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
       LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        2.15     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) =      5.47
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.56
  AVERAGE FLOW DEPTH(FEET) =  0.49   TRAVEL TIME(MIN.) =  0.45
  Tc(MIN.) =   10.31
  SUBAREA AREA(ACRES) =     2.15       SUBAREA RUNOFF(CFS) =   1.92
  EFFECTIVE AREA(ACRES) =     7.03     AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.0       PEAK FLOW RATE(CFS) =      6.26

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   FLOW VELOCITY(FEET/SEC.) =  7.84
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40515.00 =    978.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40515.00 TO NODE  40516.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    440.00  DOWNSTREAM(FEET) =    390.00
```

```
     CHANNEL LENGTH THRU SUBAREA(FEET) =   269.00   CHANNEL SLOPE =  0.1859
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.452
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
           LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
     USER-DEFINED              -         5.24      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) =       8.51
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.14
     AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   0.63
     Tc(MIN.) =   10.94
     SUBAREA AREA(ACRES) =     5.24       SUBAREA RUNOFF(CFS) =    4.49
     EFFECTIVE AREA(ACRES) =   12.27     AREA-AVERAGED Fm(INCH/HR) =   0.50
     AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =        12.3       PEAK FLOW RATE(CFS) =      10.51

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) =  0.68   FLOW VELOCITY(FEET/SEC.) =   7.53
     LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40516.00 =   1247.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40516.00 TO NODE  40517.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   390.00  DOWNSTREAM(FEET) =    355.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   384.00   CHANNEL SLOPE =  0.0911
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.385
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         4.01      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) =      12.10
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.98
   AVERAGE FLOW DEPTH(FEET) =   0.82   TRAVEL TIME(MIN.) =   1.07
   Tc(MIN.) =   12.01
   SUBAREA AREA(ACRES) =     4.01       SUBAREA RUNOFF(CFS) =    3.19
   EFFECTIVE AREA(ACRES) =    16.28     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        16.3       PEAK FLOW RATE(CFS) =      12.97

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.84   FLOW VELOCITY(FEET/SEC.) =   6.10
   LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40517.00 =   1631.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40517.00 TO NODE  40518.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   355.00  DOWNSTREAM(FEET) =    341.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   512.00   CHANNEL SLOPE =  0.0273
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.281
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         8.89      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) =      16.09
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.09
   AVERAGE FLOW DEPTH(FEET) =   1.03   TRAVEL TIME(MIN.) =   1.68
   Tc(MIN.) =   13.69
   SUBAREA AREA(ACRES) =     8.89       SUBAREA RUNOFF(CFS) =    6.25
   EFFECTIVE AREA(ACRES) =    25.17     AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        25.2       PEAK FLOW RATE(CFS) =      17.69

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.07   FLOW VELOCITY(FEET/SEC.) =   5.20
   LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40518.00 =   2143.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40518.00 TO NODE  40518.00 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.) =  13.69
   RAINFALL INTENSITY(INCH/HR) =   1.28
   AREA-AVERAGED Fm(INCH/HR) =  0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =      25.17
   TOTAL STREAM AREA(ACRES) =       25.17
   PEAK FLOW RATE(CFS) AT CONFLUENCE =       17.69

   ** CONFLUENCE DATA **
   STREAM      Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      24.71   15.68    1.175   0.50( 0.50) 1.00     40.7   40500.00
     2      17.69   13.69    1.281   0.50( 0.50) 1.00     25.2   40510.00

   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      42.40   13.69    1.281   0.50( 0.50) 1.00     60.7   40510.00
     2      40.00   15.68    1.175   0.50( 0.50) 1.00     65.8   40500.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =      42.40    Tc(MIN.) =    13.69
  EFFECTIVE AREA(ACRES) =      60.66  AREA-AVERAGED Fm(INCH/HR) = 0.50
  AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =      65.8
  LONGEST FLOWPATH FROM NODE 40500.00 TO NODE 40518.00 =   3095.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40518.00 TO NODE  40519.00 IS CODE = 51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    341.00  DOWNSTREAM(FEET) =    333.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   688.00   CHANNEL SLOPE = 0.0116
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.160
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED              -        3.34     0.50      1.000      -
  USER-DEFINED              -        2.15     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) =     44.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.74
  AVERAGE FLOW DEPTH(FEET) =  1.76   TRAVEL TIME(MIN.) =   2.42
  Tc(MIN.) =  16.11
  SUBAREA AREA(ACRES) =     5.49       SUBAREA RUNOFF(CFS) =    3.26
  EFFECTIVE AREA(ACRES) =      66.15     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      71.3        PEAK FLOW RATE(CFS) =     42.40
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.73   FLOW VELOCITY(FEET/SEC.) =   4.70
  LONGEST FLOWPATH FROM NODE 40500.00 TO NODE 40519.00 =   3783.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40519.00 TO NODE  40519.00 IS CODE = 81
-----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
  MAINLINE Tc(MIN.) =  16.11
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.160
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED              -        0.35     0.50      0.500      -
  USER-DEFINED              -        4.48     0.50      1.000      -
  USER-DEFINED              -        0.38     0.50      1.000      -
  USER-DEFINED              -        1.49     0.50      1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.974
  SUBAREA AREA(ACRES) =     6.70       SUBAREA RUNOFF(CFS) =    4.06
  EFFECTIVE AREA(ACRES) =      72.85   AREA-AVERAGED Fm(INCH/HR) = 0.50
  AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =      78.0        PEAK FLOW RATE(CFS) =     43.35
```

```
=============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =      78.0  TC(MIN.) =    16.11
  EFFECTIVE AREA(ACRES) =      72.85  AREA-AVERAGED Fm(INCH/HR)= 0.50
  AREA-AVERAGED Fp(INCH/HR) = 0.50  AREA-AVERAGED Ap = 0.998
  PEAK FLOW RATE(CFS)     =      43.35

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity  Fp(Fm)     Ap    Ae    HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)   NODE
      1     43.35  16.11   1.160   0.50( 0.50) 1.00    72.9  40510.00
      2     41.28  18.14   1.087   0.50( 0.50) 1.00    78.0  40500.00
=============================================================================

=============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                      Michael Baker International
                     5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-4 WATERSHED 6 EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 5-YR EV MARCH 2019 CCHIU                                            *
  *********************************************************************

  FILE NAME: X40605EV.DAT
  TIME/DATE OF STUDY: 14:22 03/25/2019
========================================================================
  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  60.0    30.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
```

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth = 0.00 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  40600.00 TO NODE  40601.00 IS CODE =  21
------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   279.00
 ELEVATION DATA: UPSTREAM(FEET) =   1054.00  DOWNSTREAM(FEET) =   1000.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.326
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.600
 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"                -        0.54     0.50     1.000     0    9.33
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) =       0.54
 TOTAL AREA(ACRES) =        0.54    PEAK FLOW RATE(CFS) =       0.54

*************************************************************************
  FLOW PROCESS FROM NODE  40601.00 TO NODE  40602.00 IS CODE =  51
------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    985.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   199.00   CHANNEL SLOPE = 0.0754
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.481
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/        SCS SOIL   AREA      Fp         Ap    SCS
      LAND USE              GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
 USER-DEFINED                -        0.76     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) =       0.87
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.88
 AVERAGE FLOW DEPTH(FEET) =   0.32    TRAVEL TIME(MIN.) =   1.15
 Tc(MIN.) =   10.48
 SUBAREA AREA(ACRES) =      0.76       SUBAREA RUNOFF(CFS) =    0.67
 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) =       1.15

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   3.06
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40602.00 =     478.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  40602.00 TO NODE  40603.00 IS CODE =  51
----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    985.00  DOWNSTREAM(FEET) =    958.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   282.00   CHANNEL SLOPE =  0.0957
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.402
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        1.11      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) =       1.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.72
  AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   1.26
  Tc(MIN.) =   11.74
  SUBAREA AREA(ACRES) =    1.11      SUBAREA RUNOFF(CFS) =    0.90
  EFFECTIVE AREA(ACRES) =     2.41     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      2.4        PEAK FLOW RATE(CFS) =      1.96

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.41   FLOW VELOCITY(FEET/SEC.) =   3.90
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40603.00 =     760.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  40603.00 TO NODE  40604.00 IS CODE =  51
----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    958.00  DOWNSTREAM(FEET) =    940.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE =  0.0822
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.342
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        0.36      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) =       2.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.74
  AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   0.98
  Tc(MIN.) =   12.72
  SUBAREA AREA(ACRES) =    0.36      SUBAREA RUNOFF(CFS) =    0.27
  EFFECTIVE AREA(ACRES) =     2.77     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      2.8        PEAK FLOW RATE(CFS) =      2.10
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   3.75
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40604.00 =     979.00 FEET.

***********************************************************************
  FLOW PROCESS FROM NODE  40604.00 TO NODE  40605.00 IS CODE =  51
----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    940.00  DOWNSTREAM(FEET) =    800.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   547.00   CHANNEL SLOPE =  0.2559
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.251
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        3.00      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) =       3.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.25
  AVERAGE FLOW DEPTH(FEET) =   0.41   TRAVEL TIME(MIN.) =   1.46
  Tc(MIN.) =   14.17
  SUBAREA AREA(ACRES) =    3.00      SUBAREA RUNOFF(CFS) =    2.03
  EFFECTIVE AREA(ACRES) =     5.77     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) =      3.90

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.44   FLOW VELOCITY(FEET/SEC.) =   6.72
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40605.00 =    1526.00 FEET.

***********************************************************************
  FLOW PROCESS FROM NODE  40605.00 TO NODE  40606.00 IS CODE =  51
----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    680.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   277.00   CHANNEL SLOPE =  0.4332
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.218
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        2.22      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) =       4.62
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.54
  AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =   0.54
  Tc(MIN.) =   14.71
  SUBAREA AREA(ACRES) =    2.22      SUBAREA RUNOFF(CFS) =    1.44
  EFFECTIVE AREA(ACRES) =     7.99     AREA-AVERAGED Fm(INCH/HR) =   0.50
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   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       8.0        PEAK FLOW RATE(CFS) =         5.16

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.45   FLOW VELOCITY(FEET/SEC.) =   8.67
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40606.00 =    1803.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40606.00 TO NODE  40607.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     680.00  DOWNSTREAM(FEET) =     670.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    59.00   CHANNEL SLOPE = 0.1695
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.209
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        9.34      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) =     8.14
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.83
   AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   0.14
   Tc(MIN.) =   14.86
   SUBAREA AREA(ACRES) =      9.34        SUBAREA RUNOFF(CFS) =     5.95
   EFFECTIVE AREA(ACRES) =      17.33       AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      17.3        PEAK FLOW RATE(CFS) =        11.05

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.71   FLOW VELOCITY(FEET/SEC.) =   7.38
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40607.00 =    1862.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40607.00 TO NODE  40608.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     670.00  DOWNSTREAM(FEET) =     585.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   246.00   CHANNEL SLOPE = 0.3455
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -        4.64      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) =    12.49
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.99
   AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   0.41
   Tc(MIN.) =   15.27
```

```
   SUBAREA AREA(ACRES) =       4.64        SUBAREA RUNOFF(CFS) =     2.88
   EFFECTIVE AREA(ACRES) =      21.96       AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       22.0        PEAK FLOW RATE(CFS) =        13.64

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.67   FLOW VELOCITY(FEET/SEC.) =  10.17
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40608.00 =    2108.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40608.00 TO NODE  40609.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     585.00  DOWNSTREAM(FEET) =     494.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   482.00   CHANNEL SLOPE = 0.1888
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.156
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        8.61      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) =    16.18
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.47
   AVERAGE FLOW DEPTH(FEET) =   0.80   TRAVEL TIME(MIN.) =   0.95
   Tc(MIN.) =   16.22
   SUBAREA AREA(ACRES) =       8.61        SUBAREA RUNOFF(CFS) =     5.08
   EFFECTIVE AREA(ACRES) =      30.57       AREA-AVERAGED Fm(INCH/HR) =   0.50
   AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       30.6        PEAK FLOW RATE(CFS) =        18.05

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.83   FLOW VELOCITY(FEET/SEC.) =   8.64
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40609.00 =    2590.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40609.00 TO NODE  40610.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     494.00  DOWNSTREAM(FEET) =     470.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   236.00   CHANNEL SLOPE = 0.1017
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.137
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       18.33      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) =    23.30
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.36
```

```
  AVERAGE FLOW DEPTH(FEET) =   1.03   TRAVEL TIME(MIN.) =   0.53
  Tc(MIN.) =   16.75
  SUBAREA AREA(ACRES) =    18.33     SUBAREA RUNOFF(CFS) =   10.50
  EFFECTIVE AREA(ACRES) =     48.90     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        48.9       PEAK FLOW RATE(CFS) =      28.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =   1.10   FLOW VELOCITY(FEET/SEC.) =   7.70
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40610.00 =   2826.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40610.00 TO NODE  40611.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =     425.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   560.00   CHANNEL SLOPE =  0.0804
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.090
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap       SCS
       LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        10.11      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) =      30.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.19
  AVERAGE FLOW DEPTH(FEET) =   1.19   TRAVEL TIME(MIN.) =   1.30
  Tc(MIN.) =   18.05
  SUBAREA AREA(ACRES) =    10.11     SUBAREA RUNOFF(CFS) =    5.37
  EFFECTIVE AREA(ACRES) =     59.01     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        59.0       PEAK FLOW RATE(CFS) =      31.34

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =   1.20   FLOW VELOCITY(FEET/SEC.) =   7.25
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40611.00 =   3386.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40611.00 TO NODE  40612.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    425.00  DOWNSTREAM(FEET) =     373.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   906.00   CHANNEL SLOPE =  0.0574
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.012
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap       SCS
       LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        20.87      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) =      36.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.64
  AVERAGE FLOW DEPTH(FEET) =   1.35   TRAVEL TIME(MIN.) =   2.28
  Tc(MIN.) =   20.32
  SUBAREA AREA(ACRES) =    20.87     SUBAREA RUNOFF(CFS) =    9.62
  EFFECTIVE AREA(ACRES) =     79.89     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        79.9       PEAK FLOW RATE(CFS) =      36.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =   1.36   FLOW VELOCITY(FEET/SEC.) =   6.63
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40612.00 =   4292.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40612.00 TO NODE  40613.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    373.00  DOWNSTREAM(FEET) =     328.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1192.00   CHANNEL SLOPE =  0.0378
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.945
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap       SCS
       LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -         0.04      0.50      1.000      -
  USER-DEFINED               -         0.14      0.50      1.000      -
  USER-DEFINED               -         0.96      0.50      1.000      -
  USER-DEFINED               -         0.21      0.50      1.000      -
  USER-DEFINED               -         0.71      0.50      1.000      -
  USER-DEFINED               -         3.41      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) =      37.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.12
  AVERAGE FLOW DEPTH(FEET) =   1.33   TRAVEL TIME(MIN.) =   2.79
  Tc(MIN.) =   23.12
  SUBAREA AREA(ACRES) =     5.47     SUBAREA RUNOFF(CFS) =    2.19
  EFFECTIVE AREA(ACRES) =     85.36     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        85.4       PEAK FLOW RATE(CFS) =      36.81
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =   1.32   FLOW VELOCITY(FEET/SEC.) =   7.01
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40613.00 =   5484.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40613.00 TO NODE  40613.00 IS CODE = 81
-------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
  MAINLINE Tc(MIN.) =   23.12
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.945
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap       SCS
```

```
            LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                    -       0.07      0.50      1.000     -
  USER-DEFINED                    -       0.69      0.50      1.000     -
  USER-DEFINED                    -       0.99      0.50      1.000     -
  USER-DEFINED                    -       4.13      0.50      1.000     -
  USER-DEFINED                    -       0.72      0.50      1.000     -
  USER-DEFINED                    -       0.26      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) =    6.86      SUBAREA RUNOFF(CFS) =    2.75
  EFFECTIVE AREA(ACRES) =     92.22   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       92.2       PEAK FLOW RATE(CFS) =      36.93


*******************************************************************************
  FLOW PROCESS FROM NODE  40613.00 TO NODE  40613.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =   23.12
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  0.945
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                    -       6.92      0.50      1.000     -
  USER-DEFINED                    -       2.35      0.50      1.000     -
  USER-DEFINED                    -       0.47      0.50      1.000     -
  USER-DEFINED                    -       3.66      0.50      1.000     -
  USER-DEFINED                    -       0.31      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) =   13.71      SUBAREA RUNOFF(CFS) =    5.49
  EFFECTIVE AREA(ACRES) =    105.93   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      105.9       PEAK FLOW RATE(CFS) =      42.43
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      105.9  TC(MIN.) =     23.12
  EFFECTIVE AREA(ACRES) =    105.93  AREA-AVERAGED Fm(INCH/HR)=  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       42.43
===============================================================================
===============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                    Michael Baker International
                  5 Hutton Centre Drive Suite 500
                       Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 3 EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 10-YR EV MARCH 2019 CCHIU                                             *
 *************************************************************************

  FILE NAME: X30310EV.DAT
  TIME/DATE OF STUDY: 10:53 03/25/2019
 ========================================================================
  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  60.0     30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =   0.00 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  30300.00 TO NODE  30301.00 IS CODE =  21
 ------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
  ELEVATION DATA: UPSTREAM(FEET) =   622.00  DOWNSTREAM(FEET) =   551.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.676
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.198
  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
  "CHAPARRAL,NARROWLEAF"     -       1.80    0.30     1.000    0   9.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      3.07
  TOTAL AREA(ACRES) =       1.80   PEAK FLOW RATE(CFS) =       3.07

 ************************************************************************
  FLOW PROCESS FROM NODE  30301.00 TO NODE  30302.00 IS CODE =  51
 ------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   551.00  DOWNSTREAM(FEET) =   508.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 2187.00   CHANNEL SLOPE = 0.0197
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.370
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL   AREA     Fp       Ap    SCS
        LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -       6.70    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) =      6.41
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.86
  AVERAGE FLOW DEPTH(FEET) =   0.86   TRAVEL TIME(MIN.) = 12.76
  Tc(MIN.) =  22.44
  SUBAREA AREA(ACRES) =    6.70       SUBAREA RUNOFF(CFS) =     6.45
  EFFECTIVE AREA(ACRES) =      8.50     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       8.5        PEAK FLOW RATE(CFS) =      8.19

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.94   FLOW VELOCITY(FEET/SEC.) =   3.07
  LONGEST FLOWPATH FROM NODE  30300.00 TO NODE  30302.00 =   2512.00 FEET.
 ========================================================================
 ========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        8.5  TC(MIN.) =    22.44
  EFFECTIVE AREA(ACRES) =       8.50  AREA-AVERAGED Fm(INCH/HR)= 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =        8.19
 ========================================================================
 ========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                      Michael Baker International
                    5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY ***************************
 * RMV PA-3 WATERSHED 4A EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 10-YR EV MARCH 2019 CCHIU                                              *
 *************************************************************************

  FILE NAME: X34A10EV.DAT
  TIME/DATE OF STUDY: 10:48 03/25/2019
=========================================================================
  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  60.0     30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30400.00 TO NODE  30401.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
  ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    580.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.150
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.420
  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.)
  AGRICULTURAL POOR COVER
  "ROW CROPS,STRAIGHT ROW"   -       0.26     0.30     1.000     0   8.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.49
  TOTAL AREA(ACRES) =      0.26   PEAK FLOW RATE(CFS) =      0.49

************************************************************************
  FLOW PROCESS FROM NODE  30401.00 TO NODE  30402.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    580.00  DOWNSTREAM(FEET) =    540.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  220.00   CHANNEL SLOPE = 0.1818
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.281
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp       Ap     SCS
        LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  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
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.84
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.03
  AVERAGE FLOW DEPTH(FEET) =   0.26   TRAVEL TIME(MIN.) =   0.91
  Tc(MIN.) =   9.06
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =     0.71
  EFFECTIVE AREA(ACRES) =       0.65      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =          0.7       PEAK FLOW RATE(CFS) =       1.16

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =   4.30
  LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30402.00 =     536.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE  30402.00 TO NODE  30403.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    491.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  151.00   CHANNEL SLOPE = 0.3245
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.225
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp         Ap      SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -         0.12      0.30      1.000     -
 USER-DEFINED               -         0.86      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) =     2.01
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.13
 AVERAGE FLOW DEPTH(FEET) =  0.33   TRAVEL TIME(MIN.) =  0.41
 Tc(MIN.) =   9.47
 SUBAREA AREA(ACRES) =     0.98     SUBAREA RUNOFF(CFS) =    1.70
 EFFECTIVE AREA(ACRES) =      1.63     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        1.6        PEAK FLOW RATE(CFS) =      2.83

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38   FLOW VELOCITY(FEET/SEC.) = 6.64
 LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30403.00 =    687.00 FEET.

*******************************************************************************
 FLOW PROCESS FROM NODE  30403.00 TO NODE  30404.00 IS CODE =  51
-------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    491.00  DOWNSTREAM(FEET) =    473.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE = 0.1059
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.152
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp         Ap      SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -         1.00      0.30      1.000     -
 USER-DEFINED               -         1.00      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) =     4.50
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.92
 AVERAGE FLOW DEPTH(FEET) =  0.55   TRAVEL TIME(MIN.) =  0.58
 Tc(MIN.) =   10.05
 SUBAREA AREA(ACRES) =     2.00     SUBAREA RUNOFF(CFS) =    3.33
 EFFECTIVE AREA(ACRES) =      3.63     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) =      6.06

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.62   FLOW VELOCITY(FEET/SEC.) = 5.33
 LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30404.00 =    857.00 FEET.

*******************************************************************************
 FLOW PROCESS FROM NODE  30404.00 TO NODE  30405.00 IS CODE =  51
-------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    473.00  DOWNSTREAM(FEET) =    430.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   289.00   CHANNEL SLOPE = 0.1488
```

```
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.086
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp         Ap      SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        20.80      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) =    22.78
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.43
 AVERAGE FLOW DEPTH(FEET) =  0.95   TRAVEL TIME(MIN.) =  0.57
 Tc(MIN.) =   10.62
 SUBAREA AREA(ACRES) =    20.80     SUBAREA RUNOFF(CFS) =   33.44
 EFFECTIVE AREA(ACRES) =     24.43     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       24.4        PEAK FLOW RATE(CFS) =     39.28

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.16   FLOW VELOCITY(FEET/SEC.) = 9.66
 LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30405.00 =   1146.00 FEET.
===============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)        =       24.4  TC(MIN.) =      10.62
 EFFECTIVE AREA(ACRES) =       24.43  AREA-AVERAGED Fm(INCH/HR)= 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)      =       39.28
===============================================================================

===============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

                       Michael Baker International
                     5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 4B EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 10-YR EV MARCH 2019 CCHIU                                             *
 *************************************************************************

  FILE NAME: X34B10EV.DAT
  TIME/DATE OF STUDY: 10:49 03/25/2019
==========================================================================
  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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30410.00 TO NODE  30411.00 IS CODE =  21
 -------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
  ELEVATION DATA: UPSTREAM(FEET) =   615.00  DOWNSTREAM(FEET) =   558.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   7.546
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.528
  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.)
  AGRICULTURAL POOR COVER
  "ROW CROPS,STRAIGHT ROW"  -        0.59     0.30     1.000    0   7.55
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      1.18
  TOTAL AREA(ACRES) =       0.59   PEAK FLOW RATE(CFS) =       1.18

*************************************************************************
  FLOW PROCESS FROM NODE  30411.00 TO NODE  30412.00 IS CODE =  51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   558.00  DOWNSTREAM(FEET) =   534.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  137.00   CHANNEL SLOPE = 0.1752
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.444
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
  USER-DEFINED             -        0.85     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) =    2.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.89
  AVERAGE FLOW DEPTH(FEET) =   0.37   TRAVEL TIME(MIN.) =   0.47
  Tc(MIN.) =   8.01
  SUBAREA AREA(ACRES) =     0.85       SUBAREA RUNOFF(CFS) =    1.63
  EFFECTIVE AREA(ACRES) =     1.44      AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =      2.77

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   FLOW VELOCITY(FEET/SEC.) =  5.32
  LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30412.00 =    464.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30412.00 TO NODE  30413.00 IS CODE =  51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   534.00  DOWNSTREAM(FEET) =   504.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  204.00   CHANNEL SLOPE = 0.1471
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.344
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        1.59     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) =        4.23
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.50
 AVERAGE FLOW DEPTH(FEET) =  0.51   TRAVEL TIME(MIN.) =   0.62
 Tc(MIN.) =   8.63
 SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =    2.92
 EFFECTIVE AREA(ACRES) =      3.02    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) =       5.56

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.56   FLOW VELOCITY(FEET/SEC.) =  5.87
 LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30413.00 =    668.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30413.00 TO NODE  30414.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    504.00  DOWNSTREAM(FEET) =    472.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.1296
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.250
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        3.99     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) =        9.06
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.35
 AVERAGE FLOW DEPTH(FEET) =  0.69   TRAVEL TIME(MIN.) =   0.65
 Tc(MIN.) =   9.28
 SUBAREA AREA(ACRES) =     3.99      SUBAREA RUNOFF(CFS) =    7.00
 EFFECTIVE AREA(ACRES) =      7.01    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        7.0       PEAK FLOW RATE(CFS) =      12.31

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.77   FLOW VELOCITY(FEET/SEC.) =  6.86
 LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30414.00 =    915.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30414.00 TO NODE  30415.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    472.00  DOWNSTREAM(FEET) =    447.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   345.00   CHANNEL SLOPE =  0.0725
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
*   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.129
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        6.31     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) =       17.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.99
 AVERAGE FLOW DEPTH(FEET) =  0.99   TRAVEL TIME(MIN.) =   0.96
 Tc(MIN.) =   10.24
 SUBAREA AREA(ACRES) =     6.31      SUBAREA RUNOFF(CFS) =   10.39
 EFFECTIVE AREA(ACRES) =     13.32    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      21.93

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.07   FLOW VELOCITY(FEET/SEC.) =  6.37
 LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30415.00 =   1260.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30415.00 TO NODE  30416.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =    403.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   781.00   CHANNEL SLOPE =  0.0563
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.921
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -       11.95     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) =       30.65
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.32
 AVERAGE FLOW DEPTH(FEET) =  1.27   TRAVEL TIME(MIN.) =   2.06
 Tc(MIN.) =   12.30
 SUBAREA AREA(ACRES) =    11.95      SUBAREA RUNOFF(CFS) =   17.43
 EFFECTIVE AREA(ACRES) =     25.27    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       25.3       PEAK FLOW RATE(CFS) =      36.87

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.36   FLOW VELOCITY(FEET/SEC.) =  6.62
 LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30416.00 =   2041.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30416.00 TO NODE  30417.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    403.00  DOWNSTREAM(FEET) =    387.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   383.00   CHANNEL SLOPE =  0.0418
```

```
CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =    3.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
*   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             -         2.70       0.30       1.000      -
 USER-DEFINED             -         2.80       0.30       1.000      -
 USER-DEFINED             -         2.90       0.30       1.000      -
 USER-DEFINED             -         0.90       0.30       1.000      -
 USER-DEFINED             -         0.10       0.30       1.000      -
 USER-DEFINED             -         3.20       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) =      45.58
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.23
 AVERAGE FLOW DEPTH(FEET) =  1.56    TRAVEL TIME(MIN.) =   1.02
 Tc(MIN.) =   13.32
 SUBAREA AREA(ACRES) =    12.60        SUBAREA RUNOFF(CFS) =   17.42
 EFFECTIVE AREA(ACRES) =     37.87     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      37.9         PEAK FLOW RATE(CFS) =      52.37

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.65    FLOW VELOCITY(FEET/SEC.) =   6.45
 LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30417.00 =    2424.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  30417.00 TO NODE  30417.00 IS CODE = 81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
 MAINLINE Tc(MIN.) =   13.32
 *   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             -         0.60       0.30       1.000      -
 USER-DEFINED             -         0.10       0.30       1.000      -
 USER-DEFINED             -         0.70       0.30       1.000      -
 USER-DEFINED             -         0.20       0.30       1.000      -
 USER-DEFINED             -         0.90       0.30       1.000      -
 USER-DEFINED             -         0.10       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) =     2.60        SUBAREA RUNOFF(CFS) =    3.60
 EFFECTIVE AREA(ACRES) =     40.47     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      40.5         PEAK FLOW RATE(CFS) =      55.97

********************************************************************************
  FLOW PROCESS FROM NODE  30417.00 TO NODE  30417.00 IS CODE = 81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
 MAINLINE Tc(MIN.) =   13.32
 *   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             -         0.30       0.30       1.000      -
 USER-DEFINED             -         0.30       0.30       1.000      -
 USER-DEFINED             -         0.10       0.30       1.000      -
 USER-DEFINED             -         0.10       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) =     1.50        SUBAREA RUNOFF(CFS) =    2.07
 EFFECTIVE AREA(ACRES) =     41.97     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      42.0         PEAK FLOW RATE(CFS) =      58.04
==============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       42.0   TC(MIN.) =     13.32
 EFFECTIVE AREA(ACRES) =      41.97  AREA-AVERAGED Fm(INCH/HR)=   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.000
 PEAK FLOW RATE(CFS)   =      58.04
==============================================================================
==============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
_____
****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
            (c) Copyright 1983-2013 Advanced Engineering Software (aes)
             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                    Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 5A EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 10-YR EV MARCH 2019 CCHIU                                             *
 **************************************************************************

  FILE NAME: X35A10EV.DAT
  TIME/DATE OF STUDY: 10:49 03/25/2019
==========================================================================
  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  60.0    30.0   0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0   0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0   0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0   0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0   0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30500.00 TO NODE  30501.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   303.00
  ELEVATION DATA: UPSTREAM(FEET) =   769.00  DOWNSTREAM(FEET) =    695.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.201
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.261
  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"              -        1.01    0.30    1.000     0   9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.78
  TOTAL AREA(ACRES) =      1.01   PEAK FLOW RATE(CFS) =       1.78

****************************************************************************
  FLOW PROCESS FROM NODE  30501.00 TO NODE  30502.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.00  DOWNSTREAM(FEET) =   665.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  167.00   CHANNEL SLOPE = 0.1796
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.191
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA     Fp      Ap     SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -        0.89    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) =     2.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.24
  AVERAGE FLOW DEPTH(FEET) =   0.40    TRAVEL TIME(MIN.) =   0.53
  Tc(MIN.) =   9.73
  SUBAREA AREA(ACRES) =     0.89       SUBAREA RUNOFF(CFS) =    1.51
  EFFECTIVE AREA(ACRES) =      1.89     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.9        PEAK FLOW RATE(CFS) =      3.22

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   FLOW VELOCITY(FEET/SEC.) =   5.56
  LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30502.00 =     470.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30502.00 TO NODE  30503.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   665.00  DOWNSTREAM(FEET) =   645.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  110.00   CHANNEL SLOPE = 0.1818
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.152
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -        0.98      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) =      4.04
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.90
 AVERAGE FLOW DEPTH(FEET) = 0.48   TRAVEL TIME(MIN.) =   0.31
 Tc(MIN.) =   10.04
 SUBAREA AREA(ACRES) =     0.98     SUBAREA RUNOFF(CFS) =    1.64
 EFFECTIVE AREA(ACRES) =     2.88     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      2.9       PEAK FLOW RATE(CFS) =     4.79

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.51   FLOW VELOCITY(FEET/SEC.) =  6.18
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30503.00 =    580.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30503.00 TO NODE  30504.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    630.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  152.00   CHANNEL SLOPE = 0.0987
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.099
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -        3.30      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) =      7.47
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.47
 AVERAGE FLOW DEPTH(FEET) = 0.67   TRAVEL TIME(MIN.) =   0.46
 Tc(MIN.) =   10.51
 SUBAREA AREA(ACRES) =     3.30     SUBAREA RUNOFF(CFS) =    5.34
 EFFECTIVE AREA(ACRES) =     6.18     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      6.2       PEAK FLOW RATE(CFS) =    10.00

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.75   FLOW VELOCITY(FEET/SEC.) =  5.89
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30504.00 =    732.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30504.00 TO NODE  30505.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    600.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  329.00   CHANNEL SLOPE = 0.0912
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.008
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -        7.11      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) =     15.46
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.40
 AVERAGE FLOW DEPTH(FEET) = 0.90   TRAVEL TIME(MIN.) =   0.86
 Tc(MIN.) =   11.36
 SUBAREA AREA(ACRES) =     7.11     SUBAREA RUNOFF(CFS) =   10.93
 EFFECTIVE AREA(ACRES) =    13.28     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =     13.3       PEAK FLOW RATE(CFS) =    20.42

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.00   FLOW VELOCITY(FEET/SEC.) =  6.85
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30505.00 =   1061.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30505.00 TO NODE  30506.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    585.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  297.00   CHANNEL SLOPE = 0.0505
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.930
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -       10.71      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) =     28.28
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.92
 AVERAGE FLOW DEPTH(FEET) = 1.26   TRAVEL TIME(MIN.) =   0.84
 Tc(MIN.) =   12.20
 SUBAREA AREA(ACRES) =    10.71     SUBAREA RUNOFF(CFS) =   15.71
 EFFECTIVE AREA(ACRES) =    24.00     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =     24.0       PEAK FLOW RATE(CFS) =    35.19

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.37   FLOW VELOCITY(FEET/SEC.) =  6.26
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30506.00 =   1358.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30506.00 TO NODE  30507.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    585.00  DOWNSTREAM(FEET) =    550.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  700.00   CHANNEL SLOPE = 0.0500
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.789
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        15.01      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) =    45.25
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.64
   AVERAGE FLOW DEPTH(FEET) = 1.51   TRAVEL TIME(MIN.) =  1.76
   Tc(MIN.) =  13.96
   SUBAREA AREA(ACRES) =   15.01      SUBAREA RUNOFF(CFS) =  20.12
   EFFECTIVE AREA(ACRES) =    39.01      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     39.0          PEAK FLOW RATE(CFS) =     52.27

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.59   FLOW VELOCITY(FEET/SEC.) =  6.88
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30507.00 =   2058.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30507.00 TO NODE  30508.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    550.00  DOWNSTREAM(FEET) =    500.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1107.00   CHANNEL SLOPE = 0.0452
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.628
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        34.74      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) =    73.05
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.22
   AVERAGE FLOW DEPTH(FEET) = 1.84   TRAVEL TIME(MIN.) =  2.55
   Tc(MIN.) =  16.51
   SUBAREA AREA(ACRES) =   34.74      SUBAREA RUNOFF(CFS) =  41.51
   EFFECTIVE AREA(ACRES) =    73.74      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     73.7          PEAK FLOW RATE(CFS) =     88.13

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.97   FLOW VELOCITY(FEET/SEC.) =  7.55
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30508.00 =   3165.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30508.00 TO NODE  30518.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    465.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  982.00   CHANNEL SLOPE = 0.0356
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.512
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        11.69      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) =    94.50
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.03
   AVERAGE FLOW DEPTH(FEET) = 2.12   TRAVEL TIME(MIN.) =  2.33
   Tc(MIN.) =  18.84
   SUBAREA AREA(ACRES) =   11.69      SUBAREA RUNOFF(CFS) =  12.75
   EFFECTIVE AREA(ACRES) =    85.43      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     85.4          PEAK FLOW RATE(CFS) =     93.16

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.10   FLOW VELOCITY(FEET/SEC.) =  7.02
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30518.00 =   4147.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30518.00 TO NODE  30518.00 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.) =  18.84
   RAINFALL INTENSITY(INCH/HR) =  1.51
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =     85.43
   TOTAL STREAM AREA(ACRES) =     85.43
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      93.16

***************************************************************************
   FLOW PROCESS FROM NODE  30510.00 TO NODE  30511.00 IS CODE =  21
-------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  315.00
   ELEVATION DATA: UPSTREAM(FEET) =    792.00  DOWNSTREAM(FEET) =    690.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.832
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.314
   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
   "CHAPARRAL,NARROWLEAF"     -         1.17      0.30     1.000     0    8.83
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
```

```
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
    SUBAREA RUNOFF(CFS) =      2.13
    TOTAL AREA(ACRES) =       1.17   PEAK FLOW RATE(CFS) =       2.13


*************************************************************************
   FLOW PROCESS FROM NODE  30511.00 TO NODE  30512.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    690.00  DOWNSTREAM(FEET) =    650.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   182.00   CHANNEL SLOPE = 0.2198
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.246
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED             -         2.22     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) =      4.07
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.34
   AVERAGE FLOW DEPTH(FEET) =   0.46   TRAVEL TIME(MIN.) =   0.48
   Tc(MIN.) =   9.31
   SUBAREA AREA(ACRES) =     2.22       SUBAREA RUNOFF(CFS) =    3.89
   EFFECTIVE AREA(ACRES) =      3.39     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        3.4         PEAK FLOW RATE(CFS) =      5.95

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.53    FLOW VELOCITY(FEET/SEC.) =  7.02
   LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30512.00 =    497.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  30512.00 TO NODE  30513.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   352.00   CHANNEL SLOPE = 0.1136
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.120
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED             -         2.07     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) =      7.64
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.83
   AVERAGE FLOW DEPTH(FEET) =   0.66   TRAVEL TIME(MIN.) =   1.01
   Tc(MIN.) =   10.32
   SUBAREA AREA(ACRES) =     2.07       SUBAREA RUNOFF(CFS) =    3.39
   EFFECTIVE AREA(ACRES) =      5.46     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
```

```
    TOTAL AREA(ACRES) =         5.5        PEAK FLOW RATE(CFS) =       8.95

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.70    FLOW VELOCITY(FEET/SEC.) =  6.01
   LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30513.00 =    849.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30513.00 TO NODE  30514.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =    605.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    49.00   CHANNEL SLOPE = 0.1020
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.106
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED             -         6.01     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) =     13.83
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.47
   AVERAGE FLOW DEPTH(FEET) =   0.84   TRAVEL TIME(MIN.) =   0.13
   Tc(MIN.) =   10.44
   SUBAREA AREA(ACRES) =     6.01       SUBAREA RUNOFF(CFS) =    9.77
   EFFECTIVE AREA(ACRES) =     11.47     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        11.5        PEAK FLOW RATE(CFS) =     18.65

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.94    FLOW VELOCITY(FEET/SEC.) =  6.99
   LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30514.00 =    898.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30514.00 TO NODE  30515.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    600.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    29.00   CHANNEL SLOPE = 0.1724
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.100
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED             -         4.23     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) =     22.08
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.83
   AVERAGE FLOW DEPTH(FEET) =   0.91   TRAVEL TIME(MIN.) =   0.05
   Tc(MIN.) =   10.50
   SUBAREA AREA(ACRES) =     4.23       SUBAREA RUNOFF(CFS) =    6.86
```

```
    EFFECTIVE AREA(ACRES) =     15.71     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =       15.7       PEAK FLOW RATE(CFS) =     25.44

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.96   FLOW VELOCITY(FEET/SEC.) =   9.12
    LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30515.00 =     927.00 FEET.

**************************************************************************
    FLOW PROCESS FROM NODE  30515.00 TO NODE  30516.00 IS CODE =  51
--------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    574.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    444.00   CHANNEL SLOPE = 0.0586
    CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.979
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE             GROUP   (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED               -        6.53      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) =      30.37
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.36
    AVERAGE FLOW DEPTH(FEET) =  1.26   TRAVEL TIME(MIN.) =   1.16
    Tc(MIN.) =  11.66
    SUBAREA AREA(ACRES) =     6.53       SUBAREA RUNOFF(CFS) =     9.86
    EFFECTIVE AREA(ACRES) =     22.23    AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =       22.2       PEAK FLOW RATE(CFS) =     33.60

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 1.31   FLOW VELOCITY(FEET/SEC.) =   6.53
    LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30516.00 =    1371.00 FEET.

**************************************************************************
    FLOW PROCESS FROM NODE  30516.00 TO NODE  30517.00 IS CODE =  51
--------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =    519.00
    CHANNEL LENGTH THRU SUBAREA(FEET) = 1042.00   CHANNEL SLOPE = 0.0528
    CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.766
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE             GROUP   (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED               -       12.01      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) =      41.53
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.63
    AVERAGE FLOW DEPTH(FEET) =  1.44   TRAVEL TIME(MIN.) =   2.62
```

```
    Tc(MIN.) =  14.28
    SUBAREA AREA(ACRES) =     12.01       SUBAREA RUNOFF(CFS) =    15.85
    EFFECTIVE AREA(ACRES) =     34.24    AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =       34.2       PEAK FLOW RATE(CFS) =     45.19

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 1.49   FLOW VELOCITY(FEET/SEC.) =   6.78
    LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30517.00 =    2413.00 FEET.

**************************************************************************
    FLOW PROCESS FROM NODE  30517.00 TO NODE  30518.00 IS CODE =  51
--------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    519.00  DOWNSTREAM(FEET) =    465.00
    CHANNEL LENGTH THRU SUBAREA(FEET) = 1223.00   CHANNEL SLOPE = 0.0442
    CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.586
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE             GROUP   (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED               -       22.15      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) =      58.01
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.76
    AVERAGE FLOW DEPTH(FEET) =  1.69   TRAVEL TIME(MIN.) =   3.01
    Tc(MIN.) =  17.29
    SUBAREA AREA(ACRES) =     22.15       SUBAREA RUNOFF(CFS) =    25.64
    EFFECTIVE AREA(ACRES) =     56.39    AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =       56.4       PEAK FLOW RATE(CFS) =     65.27

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 1.77   FLOW VELOCITY(FEET/SEC.) =   6.97
    LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30518.00 =    3636.00 FEET.

**************************************************************************
    FLOW PROCESS FROM NODE  30518.00 TO NODE  30518.00 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.) =   17.29
    RAINFALL INTENSITY(INCH/HR) =   1.59
    AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30
    AREA-AVERAGED Ap =   1.00
    EFFECTIVE STREAM AREA(ACRES) =     56.39
    TOTAL STREAM AREA(ACRES) =      56.39
    PEAK FLOW RATE(CFS) AT CONFLUENCE =     65.27

    ** CONFLUENCE DATA **
```

```
STREAM      Q      Tc   Intensity  Fp(Fm)     Ap     Ae    HEADWATER
NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
  1       93.16  18.84   1.512  0.30( 0.30) 1.00    85.4   30500.00
  2       65.27  17.29   1.586  0.30( 0.30) 1.00    56.4   30510.00

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

** PEAK FLOW RATE TABLE **
STREAM      Q      Tc   Intensity  Fp(Fm)     Ap     Ae    HEADWATER
NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
  1      156.04  17.29   1.586  0.30( 0.30) 1.00   134.8   30510.00
  2      154.65  18.84   1.512  0.30( 0.30) 1.00   141.8   30500.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      156.04    Tc(MIN.) =     17.29
EFFECTIVE AREA(ACRES) =     134.82   AREA-AVERAGED Fm(INCH/HR) = 0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) =      141.8
LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30518.00 =   4147.00 FEET.

*******************************************************************************
 FLOW PROCESS FROM NODE  30518.00 TO NODE  30519.00 IS CODE = 51
------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =    448.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   451.00   CHANNEL SLOPE =  0.0377
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.541
 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            -        0.50     0.30     1.000      -
 USER-DEFINED            -        2.40     0.30     0.000      -
 USER-DEFINED            -        2.70     0.30     1.000      -
 USER-DEFINED            -        0.10     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 =  0.671
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    160.44
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.21
 AVERAGE FLOW DEPTH(FEET) =  2.55   TRAVEL TIME(MIN.) =   0.92
 Tc(MIN.) =  18.21
 SUBAREA AREA(ACRES) =     7.30       SUBAREA RUNOFF(CFS) =    8.80
 EFFECTIVE AREA(ACRES) =    142.12      AREA-AVERAGED Fm(INCH/HR) =   0.29
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.98
 TOTAL AREA(ACRES) =       149.1       PEAK FLOW RATE(CFS) =    159.34

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.55   FLOW VELOCITY(FEET/SEC.) =   8.20
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30519.00 =   4598.00 FEET.

*******************************************************************************
 FLOW PROCESS FROM NODE  30519.00 TO NODE  30519.00 IS CODE = 81
```

```
------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
 MAINLINE Tc(MIN.) =   18.21
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.541
 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            -        0.10     0.30     1.000      -
 USER-DEFINED            -        2.80     0.30     1.000      -
 USER-DEFINED            -        0.20     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) =     3.80      SUBAREA RUNOFF(CFS) =    4.24
 EFFECTIVE AREA(ACRES) =    145.92   AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.98
 TOTAL AREA(ACRES) =       152.9      PEAK FLOW RATE(CFS) =    163.58
========================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      152.9  TC(MIN.) =      18.21
 EFFECTIVE AREA(ACRES) =    145.92  AREA-AVERAGED Fm(INCH/HR)= 0.29
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.984
 PEAK FLOW RATE(CFS)   =      163.58

 ** PEAK FLOW RATE TABLE **
 STREAM      Q      Tc   Intensity  Fp(Fm)     Ap     Ae    HEADWATER
 NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
   1      163.58  18.21   1.541  0.30( 0.29) 0.98   145.9   30510.00
   2      161.90  19.76   1.472  0.30( 0.30) 0.98   152.9   30500.00
========================================================================
========================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
   _____
   ****************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
               (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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               Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                          Analysis prepared by:

                       Michael Baker International
                     5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


   ************************** DESCRIPTION OF STUDY **************************
   * RMV PA-3 WATERSHED 5B EXISTING CONDITION                             *
   * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
   * 10-YR EV MARCH 2019 CCHIU                                            *
   ************************************************************************

     FILE NAME: X35B10EV.DAT
     TIME/DATE OF STUDY: 10:49 03/25/2019
   ================================================================================
     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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

     GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
       1. Relative Flow-Depth =  0.00 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  30530.00 TO NODE  30531.00 IS CODE =  21
   --------------------------------------------------------------------------
     >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
     >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
   ================================================================================
```

```
     INITIAL SUBAREA FLOW-LENGTH(FEET) =    318.00
     ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =    605.00

     Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
     SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.088
     *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.277
     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
     "CHAPARRAL,BROADLEAF"     -       0.05     0.30    1.000    0   9.09
     NATURAL FAIR COVER
     "OPEN BRUSH"             -        0.48     0.30    1.000    0   9.09
     SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
     SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
     SUBAREA RUNOFF(CFS) =      0.94
     TOTAL AREA(ACRES) =       0.53   PEAK FLOW RATE(CFS) =       0.94

   ************************************************************************
     FLOW PROCESS FROM NODE  30531.00 TO NODE  30532.00 IS CODE =  51
   --------------------------------------------------------------------------
     >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
     >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ================================================================================
     ELEVATION DATA: UPSTREAM(FEET) =   605.00  DOWNSTREAM(FEET) =    575.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =   123.00   CHANNEL SLOPE =  0.2439
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
     *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.225
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap    SCS
          LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
     USER-DEFINED             -        0.25     0.30    1.000    -
     USER-DEFINED             -        0.62     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) =      1.70
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.35
     AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   0.38
     Tc(MIN.) =    9.47
     SUBAREA AREA(ACRES) =     0.87        SUBAREA RUNOFF(CFS) =    1.51
     EFFECTIVE AREA(ACRES) =      1.40      AREA-AVERAGED Fm(INCH/HR) =   0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
     TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       2.42

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) =  0.37   FLOW VELOCITY(FEET/SEC.) =  5.87
     LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30532.00 =    441.00 FEET.

   ************************************************************************
     FLOW PROCESS FROM NODE  30532.00 TO NODE  30533.00 IS CODE =  51
   --------------------------------------------------------------------------
     >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
     >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ================================================================================
     ELEVATION DATA: UPSTREAM(FEET) =   575.00  DOWNSTREAM(FEET) =    565.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =    67.00   CHANNEL SLOPE =  0.1493
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
```

```
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 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              -         0.45      0.30       1.000       -
 USER-DEFINED              -         0.47      0.30       1.000       -
 USER-DEFINED              -         0.01      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) =       3.22
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.18
 AVERAGE FLOW DEPTH(FEET) =  0.45    TRAVEL TIME(MIN.) =   0.22
 Tc(MIN.) =    9.69
 SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    1.59
 EFFECTIVE AREA(ACRES) =    2.33     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       2.3         PEAK FLOW RATE(CFS) =      3.98

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49   FLOW VELOCITY(FEET/SEC.) =   5.45
 LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30533.00 =    508.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30533.00 TO NODE  30534.00 IS CODE = 51
 ---------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =    540.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   172.00   CHANNEL SLOPE = 0.1453
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.137
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap       SCS
     LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)    CN
 USER-DEFINED              -         0.01      0.30       1.000       -
 USER-DEFINED              -         0.65      0.30       1.000       -
 USER-DEFINED              -         0.52      0.30       1.000       -
 USER-DEFINED              -         0.36      0.30       1.000       -
 USER-DEFINED              -         0.01      0.30       1.000       -
 USER-DEFINED              -         0.34      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) =       5.54
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.85
 AVERAGE FLOW DEPTH(FEET) =  0.56    TRAVEL TIME(MIN.) =   0.49
 Tc(MIN.) =   10.18
 SUBAREA AREA(ACRES) =    1.89      SUBAREA RUNOFF(CFS) =    3.12
 EFFECTIVE AREA(ACRES) =    4.22     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) =      6.98

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.61   FLOW VELOCITY(FEET/SEC.) =   6.18
 LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30534.00 =    680.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE  30534.00 TO NODE  30535.00 IS CODE = 51
 ---------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ================================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    510.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   302.00   CHANNEL SLOPE = 0.0993
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap       SCS
     LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)    CN
 USER-DEFINED              -         0.58      0.30       1.000       -
 USER-DEFINED              -         0.16      0.30       1.000       -
 USER-DEFINED              -         0.03      0.30       1.000       -
 USER-DEFINED              -         1.37      0.30       1.000       -
 USER-DEFINED              -         0.22      0.30       1.000       -
 USER-DEFINED              -         0.41      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) =       9.15
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.76
 AVERAGE FLOW DEPTH(FEET) =  0.73    TRAVEL TIME(MIN.) =   0.87
 Tc(MIN.) =   11.05
 SUBAREA AREA(ACRES) =    2.77      SUBAREA RUNOFF(CFS) =    4.34
 EFFECTIVE AREA(ACRES) =    6.99     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       7.0         PEAK FLOW RATE(CFS) =     10.95

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.78   FLOW VELOCITY(FEET/SEC.) =   6.07
 LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30535.00 =    982.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30535.00 TO NODE  30535.00 IS CODE = 81
 ---------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ================================================================================
 MAINLINE Tc(MIN.) =   11.05
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap       SCS
     LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)    CN
 USER-DEFINED              -         0.36      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) =    0.36      SUBAREA RUNOFF(CFS) =    0.56
 EFFECTIVE AREA(ACRES) =    7.35    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       7.3         PEAK FLOW RATE(CFS) =     11.51

****************************************************************************
 FLOW PROCESS FROM NODE  30535.00 TO NODE  30536.00 IS CODE = 51
 ---------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     510.00  DOWNSTREAM(FEET) =      490.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  356.00   CHANNEL SLOPE = 0.0562
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.933
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -         0.85      0.30      1.000     -
   USER-DEFINED               -         0.32      0.30      1.000     -
   USER-DEFINED               -         0.09      0.30      1.000     -
   USER-DEFINED               -         2.69      0.30      1.000     -
   USER-DEFINED               -         0.84      0.30      1.000     -
   USER-DEFINED               -         1.63      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) =     16.23
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.36
   AVERAGE FLOW DEPTH(FEET) =   1.00   TRAVEL TIME(MIN.) =   1.11
   Tc(MIN.) =  12.16
   SUBAREA AREA(ACRES) =    6.42      SUBAREA RUNOFF(CFS) =    9.44
   EFFECTIVE AREA(ACRES) =    13.77     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      13.8         PEAK FLOW RATE(CFS) =     20.24

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.09   FLOW VELOCITY(FEET/SEC.) =  5.70
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30536.00 =   1338.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  30536.00 TO NODE  30536.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   12.16
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.933
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -         0.45      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) =    0.45       SUBAREA RUNOFF(CFS) =    0.66
   EFFECTIVE AREA(ACRES) =     14.22    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      14.2       PEAK FLOW RATE(CFS) =     20.90

********************************************************************************
   FLOW PROCESS FROM NODE  30536.00 TO NODE  30537.00 IS CODE =  51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     490.00  DOWNSTREAM(FEET) =      455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  556.00   CHANNEL SLOPE = 0.0629
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.813
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -         0.49      0.30      1.000     -
   USER-DEFINED               -         2.10      0.30      1.000     -
   USER-DEFINED               -         0.33      0.30      1.000     -
   USER-DEFINED               -         0.39      0.30      1.000     -
   USER-DEFINED               -         3.76      0.30      1.000     -
   USER-DEFINED               -         0.02      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) =     25.73
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.26
   AVERAGE FLOW DEPTH(FEET) =   1.17   TRAVEL TIME(MIN.) =   1.48
   Tc(MIN.) =  13.64
   SUBAREA AREA(ACRES) =    7.09       SUBAREA RUNOFF(CFS) =    9.65
   EFFECTIVE AREA(ACRES) =     21.31    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      21.3         PEAK FLOW RATE(CFS) =     29.01

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.22   FLOW VELOCITY(FEET/SEC.) =  6.46
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30537.00 =   1894.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  30537.00 TO NODE  30537.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   13.64
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.813
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -         0.49      0.30      1.000     -
   USER-DEFINED               -         3.83      0.30      1.000     -
   USER-DEFINED               -         0.39      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) =    4.71       SUBAREA RUNOFF(CFS) =    6.41
   EFFECTIVE AREA(ACRES) =     26.02    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      26.0       PEAK FLOW RATE(CFS) =     35.42

********************************************************************************
   FLOW PROCESS FROM NODE  30537.00 TO NODE  30538.00 IS CODE =  51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     455.00  DOWNSTREAM(FEET) =      417.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  569.00   CHANNEL SLOPE = 0.0668
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.728
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
```

```
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        35.49    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) =      58.24
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.89
 AVERAGE FLOW DEPTH(FEET) =   1.57   TRAVEL TIME(MIN.) =   1.20
 Tc(MIN.) =   14.84
 SUBAREA AREA(ACRES) =   35.49       SUBAREA RUNOFF(CFS) =   45.63
 EFFECTIVE AREA(ACRES) =      61.51    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        61.5        PEAK FLOW RATE(CFS) =      79.08

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.76   FLOW VELOCITY(FEET/SEC.) =  8.51
 LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30538.00 =   2463.00 FEET.
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        61.5  TC(MIN.) =     14.84
 EFFECTIVE AREA(ACRES) =      61.51   AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       79.08
================================================================================
================================================================================
 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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              Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                    Michael Baker International
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                       Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 5C EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 10-YR EV MARCH 2019 CCHIU                                           *
 ********************************************************************

    FILE NAME: X35C10EV.DAT
    TIME/DATE OF STUDY: 10:50 03/25/2019
======================================================================
   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  60.0     30.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  30550.00 TO NODE  30551.00 IS CODE = 21
 --------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =    330.00
   ELEVATION DATA: UPSTREAM(FEET) =    865.00  DOWNSTREAM(FEET) =    700.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.249
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.404
   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
   "CHAPARRAL,BROADLEAF"     -        1.55      0.30     1.000     0   8.25
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =      2.93
   TOTAL AREA(ACRES) =       1.55    PEAK FLOW RATE(CFS) =      2.93

****************************************************************************
   FLOW PROCESS FROM NODE  30551.00 TO NODE  30552.00 IS CODE = 51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    700.00  DOWNSTREAM(FEET) =    685.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   304.00   CHANNEL SLOPE = 0.0493
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.202
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap    SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL) CN
   USER-DEFINED             -         1.49      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) =     4.20
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.64
   AVERAGE FLOW DEPTH(FEET) =   0.62    TRAVEL TIME(MIN.) =   1.39
   Tc(MIN.) =   9.64
   SUBAREA AREA(ACRES) =     1.49       SUBAREA RUNOFF(CFS) =    2.54
   EFFECTIVE AREA(ACRES) =      3.03       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) =       5.19

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.67   FLOW VELOCITY(FEET/SEC.) =   3.87
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30552.00 =     634.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30552.00 TO NODE  30553.00 IS CODE = 51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    685.00  DOWNSTREAM(FEET) =    650.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    84.00   CHANNEL SLOPE = 0.4167
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.184
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -         3.11     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) =       7.83
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.52
 AVERAGE FLOW DEPTH(FEET) =  0.52   TRAVEL TIME(MIN.) =  0.15
 Tc(MIN.) =   9.79
 SUBAREA AREA(ACRES) =    3.11     SUBAREA RUNOFF(CFS) =    5.28
 EFFECTIVE AREA(ACRES) =     6.15    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) =      10.42

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.58   FLOW VELOCITY(FEET/SEC.) = 10.16
 LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30553.00 =    718.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30553.00 TO NODE  30554.00 IS CODE =  51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    620.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   370.00  CHANNEL SLOPE = 0.0811
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.062
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -         3.21     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) =      12.96
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.85
 AVERAGE FLOW DEPTH(FEET) =  0.86   TRAVEL TIME(MIN.) =  1.05
 Tc(MIN.) =  10.84
 SUBAREA AREA(ACRES) =    3.21     SUBAREA RUNOFF(CFS) =    5.08
 EFFECTIVE AREA(ACRES) =     9.35    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        9.4      PEAK FLOW RATE(CFS) =      14.83

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.91   FLOW VELOCITY(FEET/SEC.) =  6.03
 LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30554.00 =   1088.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30554.00 TO NODE  30555.00 IS CODE =  51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =    604.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   151.00  CHANNEL SLOPE = 0.1060
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
*   5 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
 USER-DEFINED             -        14.25     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) =      25.90
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.64
 AVERAGE FLOW DEPTH(FEET) =  1.06   TRAVEL TIME(MIN.) =  0.33
 Tc(MIN.) =  11.17
 SUBAREA AREA(ACRES) =   14.25     SUBAREA RUNOFF(CFS) =   22.15
 EFFECTIVE AREA(ACRES) =    23.60    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       23.6      PEAK FLOW RATE(CFS) =      36.69

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.21   FLOW VELOCITY(FEET/SEC.) =  8.35
 LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30555.00 =   1239.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30555.00 TO NODE  30556.00 IS CODE =  51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   604.00  DOWNSTREAM(FEET) =    543.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1099.00   CHANNEL SLOPE = 0.0555
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.806
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        23.90     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) =      52.91
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.18
 AVERAGE FLOW DEPTH(FEET) =  1.57   TRAVEL TIME(MIN.) =  2.55
 Tc(MIN.) =  13.72
 SUBAREA AREA(ACRES) =   23.90     SUBAREA RUNOFF(CFS) =   32.40
 EFFECTIVE AREA(ACRES) =    47.50    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       47.5      PEAK FLOW RATE(CFS) =      64.39

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.69   FLOW VELOCITY(FEET/SEC.) =  7.52
 LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30556.00 =   2338.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30556.00 TO NODE  30557.00 IS CODE =  51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   543.00  DOWNSTREAM(FEET) =    503.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1074.00   CHANNEL SLOPE = 0.0372
```

```
    CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.637
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE          GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED             -         23.19     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) =      78.35
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.83
    AVERAGE FLOW DEPTH(FEET) =  1.96   TRAVEL TIME(MIN.) =   2.62
    Tc(MIN.) =   16.35
    SUBAREA AREA(ACRES) =    23.19       SUBAREA RUNOFF(CFS) =   27.90
    EFFECTIVE AREA(ACRES) =     70.69     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =      70.7         PEAK FLOW RATE(CFS)       85.07

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  2.02    FLOW VELOCITY(FEET/SEC.) =  6.97
    LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30557.00 =   3412.00 FEET.

***************************************************************************
    FLOW PROCESS FROM NODE  30557.00 TO NODE  30558.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    503.00  DOWNSTREAM(FEET) =    460.00
    CHANNEL LENGTH THRU SUBAREA(FEET) = 1155.00   CHANNEL SLOPE = 0.0372
    CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.509
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE          GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED             -         59.03     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) =     117.21
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.54
    AVERAGE FLOW DEPTH(FEET) =  2.28   TRAVEL TIME(MIN.) =   2.55
    Tc(MIN.) =   18.90
    SUBAREA AREA(ACRES) =    59.03       SUBAREA RUNOFF(CFS) =   64.23
    EFFECTIVE AREA(ACRES) =    129.73     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =     129.7         PEAK FLOW RATE(CFS)      141.13

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  2.44    FLOW VELOCITY(FEET/SEC.) =  7.91
    LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30558.00 =   4567.00 FEET.

***************************************************************************
    FLOW PROCESS FROM NODE  30558.00 TO NODE  30559.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
```

```
    ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    399.00
    CHANNEL LENGTH THRU SUBAREA(FEET) = 1322.00   CHANNEL SLOPE = 0.0461
    CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.408
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE          GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED             -         45.38     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) =     163.77
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.90
    AVERAGE FLOW DEPTH(FEET) =  2.48   TRAVEL TIME(MIN.) =   2.48
    Tc(MIN.) =   21.37
    SUBAREA AREA(ACRES) =    45.38       SUBAREA RUNOFF(CFS) =   45.26
    EFFECTIVE AREA(ACRES) =    175.11     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =     175.1         PEAK FLOW RATE(CFS)      174.62

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  2.54    FLOW VELOCITY(FEET/SEC.) =  9.04
    LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30559.00 =   5889.00 FEET.

***************************************************************************
    FLOW PROCESS FROM NODE  30559.00 TO NODE  30560.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    399.00  DOWNSTREAM(FEET) =    375.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  373.00   CHANNEL SLOPE = 0.0643
    CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.386
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE          GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED             -         12.10     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) =     180.53
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.31
    AVERAGE FLOW DEPTH(FEET) =  2.42   TRAVEL TIME(MIN.) =   0.60
    Tc(MIN.) =   21.98
    SUBAREA AREA(ACRES) =    12.10       SUBAREA RUNOFF(CFS) =   11.83
    EFFECTIVE AREA(ACRES) =    187.21     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =     187.2         PEAK FLOW RATE(CFS)      183.00

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  2.43    FLOW VELOCITY(FEET/SEC.) =  10.34
    LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30560.00 =   6262.00 FEET.
=========================================================================
    END OF STUDY SUMMARY:
    TOTAL AREA(ACRES)     =     187.2  TC(MIN.) =     21.98
    EFFECTIVE AREA(ACRES) =    187.21  AREA-AVERAGED Fm(INCH/HR)=  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
```

```
   PEAK FLOW RATE(CFS)    =      183.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
*************************************************************************
           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                     Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 5D EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 10-YR EV MARCH 2019 CCHIU                                            *
 *************************************************************************

  FILE NAME: X35D10EV.DAT
  TIME/DATE OF STUDY: 10:50 03/25/2019
========================================================================
  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  60.0    30.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30520.00 TO NODE  30521.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   315.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    692.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.937
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.457
  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
  "CHAPARRAL,BROADLEAF"     -       1.83     0.30     1.000    0   7.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =     3.55
  TOTAL AREA(ACRES) =      1.83   PEAK FLOW RATE(CFS) =       3.55

*************************************************************************
  FLOW PROCESS FROM NODE  30521.00 TO NODE  30522.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    692.00  DOWNSTREAM(FEET) =    670.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  148.00   CHANNEL SLOPE = 0.1486
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.382
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap    SCS
       LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -       0.75     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.) =   5.52
  AVERAGE FLOW DEPTH(FEET) =   0.51    TRAVEL TIME(MIN.) =   0.45
  Tc(MIN.) =   8.38
  SUBAREA AREA(ACRES) =     0.75       SUBAREA RUNOFF(CFS) =    1.40
  EFFECTIVE AREA(ACRES) =     2.57     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) =      4.82

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.53   FLOW VELOCITY(FEET/SEC.) =   5.70
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30522.00 =     463.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30522.00 TO NODE  30523.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    670.00  DOWNSTREAM(FEET) =    654.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  104.00   CHANNEL SLOPE = 0.1538
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.339
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
  DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -         1.72      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) =      6.40
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.24
  AVERAGE FLOW DEPTH(FEET) =  0.58   TRAVEL TIME(MIN.) =   0.28
  Tc(MIN.) =   8.66
  SUBAREA AREA(ACRES) =    1.72      SUBAREA RUNOFF(CFS) =    3.15
  EFFECTIVE AREA(ACRES) =    4.29    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      4.3       PEAK FLOW RATE(CFS) =       7.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.64   FLOW VELOCITY(FEET/SEC.) =  6.48
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30523.00 =    567.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30523.00 TO NODE  30524.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   654.00  DOWNSTREAM(FEET) =   615.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   378.00   CHANNEL SLOPE = 0.1032
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.194
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -         3.19      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) =     10.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.02
  AVERAGE FLOW DEPTH(FEET) =  0.77   TRAVEL TIME(MIN.) =   1.05
  Tc(MIN.) =   9.71
  SUBAREA AREA(ACRES) =    3.19      SUBAREA RUNOFF(CFS) =    5.44
  EFFECTIVE AREA(ACRES) =    7.48    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      7.5       PEAK FLOW RATE(CFS) =      12.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.82   FLOW VELOCITY(FEET/SEC.) =  6.33
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30524.00 =    945.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30524.00 TO NODE  30525.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   615.00  DOWNSTREAM(FEET) =   593.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   190.00   CHANNEL SLOPE = 0.1158
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

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  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.140
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -         6.94      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) =     18.50
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.28
  AVERAGE FLOW DEPTH(FEET) =  0.92   TRAVEL TIME(MIN.) =   0.43
  Tc(MIN.) =  10.14
  SUBAREA AREA(ACRES) =    6.94      SUBAREA RUNOFF(CFS) =   11.50
  EFFECTIVE AREA(ACRES) =   14.42    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =     14.4       PEAK FLOW RATE(CFS) =      23.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.01   FLOW VELOCITY(FEET/SEC.) =  7.78
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30525.00 =   1135.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30525.00 TO NODE  30526.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   593.00  DOWNSTREAM(FEET) =   545.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   642.00   CHANNEL SLOPE = 0.0748
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.979
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -         9.38      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) =     30.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.05
  AVERAGE FLOW DEPTH(FEET) =  1.21   TRAVEL TIME(MIN.) =   1.52
  Tc(MIN.) =  11.66
  SUBAREA AREA(ACRES) =    9.38      SUBAREA RUNOFF(CFS) =   14.17
  EFFECTIVE AREA(ACRES) =   23.80    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =     23.8       PEAK FLOW RATE(CFS) =      35.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.28   FLOW VELOCITY(FEET/SEC.) =  7.27
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30526.00 =   1777.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30526.00 TO NODE  30527.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   545.00  DOWNSTREAM(FEET) =   483.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1032.00   CHANNEL SLOPE = 0.0601
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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               -        21.43      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) =     50.30
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.30
   AVERAGE FLOW DEPTH(FEET) = 1.52   TRAVEL TIME(MIN.) =   2.36
   Tc(MIN.) =   14.02
   SUBAREA AREA(ACRES) =     21.43      SUBAREA RUNOFF(CFS) =   28.63
   EFFECTIVE AREA(ACRES) =      45.23     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        45.2        PEAK FLOW RATE(CFS) =      60.44

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.62   FLOW VELOCITY(FEET/SEC.) =   7.66
   LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30527.00 =   2809.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30527.00 TO NODE  30528.00 IS CODE =  51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    483.00  DOWNSTREAM(FEET) =    456.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   473.00   CHANNEL SLOPE =  0.0571
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.716
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        11.90      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) =     68.02
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.72
   AVERAGE FLOW DEPTH(FEET) = 1.71   TRAVEL TIME(MIN.) =   1.02
   Tc(MIN.) =   15.04
   SUBAREA AREA(ACRES) =     11.90      SUBAREA RUNOFF(CFS) =   15.16
   EFFECTIVE AREA(ACRES) =      57.13     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        57.1        PEAK FLOW RATE(CFS) =      72.78

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.76   FLOW VELOCITY(FEET/SEC.) =   7.85
   LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30528.00 =   3282.00 FEET.
   ========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =       57.1  TC(MIN.) =      15.04
   EFFECTIVE AREA(ACRES) =      57.13  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)    =       72.78
   ========================================================================
```

```
========================================================================
   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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                          Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 6 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 10-YR EV MARCH 2019 CCHIU                                          *
 *********************************************************************

  FILE NAME: X30610EV.DAT
  TIME/DATE OF STUDY: 10:53 03/25/2019
 ===================================================================
  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  60.0    30.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30600.00 TO NODE  30601.00 IS CODE =  21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ===================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   328.00
  ELEVATION DATA: UPSTREAM(FEET) =    552.00  DOWNSTREAM(FEET) =    508.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.706
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.076
  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"              -        0.29     0.30     1.000     0  10.71
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =       0.29   PEAK FLOW RATE(CFS) =       0.46

*************************************************************************
  FLOW PROCESS FROM NODE  30601.00 TO NODE  30602.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    508.00  DOWNSTREAM(FEET) =    480.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  176.00   CHANNEL SLOPE = 0.1591
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.994
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        0.29     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) =      0.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    3.67
  AVERAGE FLOW DEPTH(FEET) =    0.25   TRAVEL TIME(MIN.) =    0.80
  Tc(MIN.) =   11.51
  SUBAREA AREA(ACRES) =      0.29      SUBAREA RUNOFF(CFS) =     0.45
  EFFECTIVE AREA(ACRES) =       0.58     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         0.6        PEAK FLOW RATE(CFS) =        0.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =   3.83
  LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30602.00 =    504.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30602.00 TO NODE  30603.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    480.00  DOWNSTREAM(FEET) =    401.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  326.00   CHANNEL SLOPE = 0.2423
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.896
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
       DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap       SCS
          LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)    CN
    USER-DEFINED                -         0.76      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) =        1.43
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.01
    AVERAGE FLOW DEPTH(FEET) =  0.31   TRAVEL TIME(MIN.) =   1.08
    Tc(MIN.) =   12.59
    SUBAREA AREA(ACRES) =      0.76      SUBAREA RUNOFF(CFS) =    1.09
    EFFECTIVE AREA(ACRES) =      1.34     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) =      1.92

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.34   FLOW VELOCITY(FEET/SEC.) = 5.52
    LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30603.00 =     830.00 FEET.

***************************************************************************
    FLOW PROCESS FROM NODE  30603.00 TO NODE  30604.00 IS CODE =  51
-------------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    401.00  DOWNSTREAM(FEET) =    385.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  106.00   CHANNEL SLOPE = 0.1509
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.866
    SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap       SCS
          LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)    CN
    USER-DEFINED                -         0.33      0.30       1.000       -
    USER-DEFINED                -         0.62      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) =        2.59
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.97
    AVERAGE FLOW DEPTH(FEET) =  0.42   TRAVEL TIME(MIN.) =   0.36
    Tc(MIN.) =   12.94
    SUBAREA AREA(ACRES) =      0.95      SUBAREA RUNOFF(CFS) =    1.34
    EFFECTIVE AREA(ACRES) =      2.29     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        2.3         PEAK FLOW RATE(CFS) =      3.22

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.45   FLOW VELOCITY(FEET/SEC.) = 5.19
    LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30604.00 =     936.00 FEET.

***************************************************************************
    FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE =  81
-------------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
    MAINLINE Tc(MIN.) =   12.94
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.866
    SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap       SCS
```

```
          LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)    CN
    USER-DEFINED                -         1.27      0.30       1.000       -
    USER-DEFINED                -         0.26      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) =    1.53     SUBAREA RUNOFF(CFS) =    2.16
    EFFECTIVE AREA(ACRES) =      3.82    AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        3.8         PEAK FLOW RATE(CFS) =      5.38

***************************************************************************
    FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE =  81
-------------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
    MAINLINE Tc(MIN.) =   12.94
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.866
    SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap       SCS
          LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)    CN
    USER-DEFINED                -         1.01      0.30       1.000       -
    USER-DEFINED                -         0.29      0.30       1.000       -
    USER-DEFINED                -         0.99      0.30       1.000       -
    USER-DEFINED                -         2.11      0.30       1.000       -
    USER-DEFINED                -         1.41      0.30       1.000       -
    USER-DEFINED                -         0.02      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) =    5.83     SUBAREA RUNOFF(CFS) =    8.22
    EFFECTIVE AREA(ACRES) =      9.65    AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        9.6         PEAK FLOW RATE(CFS) =     13.60

***************************************************************************
    FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE =  81
-------------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
    MAINLINE Tc(MIN.) =   12.94
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.866
    SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap       SCS
          LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)    CN
    USER-DEFINED                -         0.21      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) =    0.21     SUBAREA RUNOFF(CFS) =    0.30
    EFFECTIVE AREA(ACRES) =      9.86    AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        9.9         PEAK FLOW RATE(CFS) =     13.89
===========================================================================
    END OF STUDY SUMMARY:
    TOTAL AREA(ACRES)      =        9.9   TC(MIN.) =     12.94
    EFFECTIVE AREA(ACRES) =       9.86  AREA-AVERAGED Fm(INCH/HR)=  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
    PEAK FLOW RATE(CFS)    =       13.89
===========================================================================
===========================================================================
```

END OF RATIONAL METHOD ANALYSIS

```
 ************************* DESCRIPTION OF STUDY *************************
* RMV PA-3 WATERSHED 7 EXISTING CONDITION                             *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
* 10-YR EV MARCH 2019 CCHIU                                           *
 *********************************************************************
```

FILE NAME: X30710EV.DAT
TIME/DATE OF STUDY: 10:53 03/25/2019
```
===============================================================================
```
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

NO.	HALF-WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
===	=====	=========	=================	======	=====	======	=====	=====
1	60.0	30.0	0.020/0.020/0.020	0.67	2.00	0.0313	0.167	0.0150
2	50.0	25.0	0.020/0.020/0.020	0.67	2.00	0.0313	0.167	0.0150
3	40.0	20.0	0.020/0.020/0.020	0.67	2.00	0.0313	0.167	0.0150
4	30.0	15.0	0.020/0.020/0.020	0.67	2.00	0.0313	0.167	0.0150
5	20.0	10.0	0.020/0.020/0.020	0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
  1. Relative Flow-Depth = 0.00 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 30700.00 TO NODE 30701.00 IS CODE = 21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===
```

```
INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
ELEVATION DATA: UPSTREAM(FEET) =   760.00  DOWNSTREAM(FEET) =    600.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.225
*  5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.408
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
```

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER "CHAPARRAL,BROADLEAF"	-	1.30	0.30	1.000	0	8.22

```
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) =      1.30   PEAK FLOW RATE(CFS) =     2.47

***************************************************************************
 FLOW PROCESS FROM NODE  30701.00 TO NODE  30702.00 IS CODE =  51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   600.00  DOWNSTREAM(FEET) =   545.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  378.00   CHANNEL SLOPE = 0.1455
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *  5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.241
 SUBAREA LOSS RATE DATA(AMC  II):
```

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
USER-DEFINED	-	2.43	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) =     4.60
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.59
 AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   1.13
 Tc(MIN.) =   9.35
 SUBAREA AREA(ACRES) =    2.43      SUBAREA RUNOFF(CFS) =    4.25
 EFFECTIVE AREA(ACRES) =      3.74     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      3.7        PEAK FLOW RATE(CFS) =     6.52

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.60   FLOW VELOCITY(FEET/SEC.) =  6.08
 LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30702.00 =    703.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  30702.00 TO NODE  30703.00 IS CODE =  51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   545.00  DOWNSTREAM(FEET) =   539.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   71.00   CHANNEL SLOPE = 0.0845
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *  5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.211
 SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        2.09     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) =       8.32
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.32
 AVERAGE FLOW DEPTH(FEET) =  0.72   TRAVEL TIME(MIN.) =  0.22
 Tc(MIN.) =  9.57
 SUBAREA AREA(ACRES) =     2.09     SUBAREA RUNOFF(CFS) =    3.60
 EFFECTIVE AREA(ACRES) =      5.83    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) =     10.02

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.78   FLOW VELOCITY(FEET/SEC.) =  5.56
 LONGEST FLOWPATH FROM NODE 30700.00 TO NODE 30703.00 =    774.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  30703.00 TO NODE  30704.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    539.00  DOWNSTREAM(FEET) =    509.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  317.00   CHANNEL SLOPE = 0.0946
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.105
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        2.46     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) =      12.02
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.06
 AVERAGE FLOW DEPTH(FEET) =  0.81   TRAVEL TIME(MIN.) =  0.87
 Tc(MIN.) =  10.45
 SUBAREA AREA(ACRES) =     2.46     SUBAREA RUNOFF(CFS) =    4.00
 EFFECTIVE AREA(ACRES) =      8.29    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =     13.47

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.85   FLOW VELOCITY(FEET/SEC.) =  6.22
 LONGEST FLOWPATH FROM NODE 30700.00 TO NODE 30704.00 =   1091.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  30704.00 TO NODE  30705.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    509.00  DOWNSTREAM(FEET) =    484.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  294.00   CHANNEL SLOPE = 0.0850
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.021
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        2.96     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) =      15.76
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.23
 AVERAGE FLOW DEPTH(FEET) =  0.92   TRAVEL TIME(MIN.) =  0.79
 Tc(MIN.) =  11.23
 SUBAREA AREA(ACRES) =     2.96     SUBAREA RUNOFF(CFS) =    4.59
 EFFECTIVE AREA(ACRES) =     11.25    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) =     17.43

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.96   FLOW VELOCITY(FEET/SEC.) =  6.35
 LONGEST FLOWPATH FROM NODE 30700.00 TO NODE 30705.00 =   1385.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  30705.00 TO NODE  30706.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    484.00  DOWNSTREAM(FEET) =    464.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  257.00   CHANNEL SLOPE = 0.0778
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.959
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        7.40     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) =      22.96
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.65
 AVERAGE FLOW DEPTH(FEET) =  1.07   TRAVEL TIME(MIN.) =  0.64
 Tc(MIN.) =  11.88
 SUBAREA AREA(ACRES) =     7.40     SUBAREA RUNOFF(CFS) =   11.05
 EFFECTIVE AREA(ACRES) =     18.66    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       18.7       PEAK FLOW RATE(CFS) =     27.85

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.16   FLOW VELOCITY(FEET/SEC.) =  6.94
 LONGEST FLOWPATH FROM NODE 30700.00 TO NODE 30706.00 =   1642.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  30706.00 TO NODE  30707.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    464.00  DOWNSTREAM(FEET) =    455.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  147.00   CHANNEL SLOPE = 0.0612
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.925
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap      SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         7.29       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) =      33.18
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.62
   AVERAGE FLOW DEPTH(FEET) = 1.29   TRAVEL TIME(MIN.) =  0.37
   Tc(MIN.) =  12.25
   SUBAREA AREA(ACRES) =     7.29      SUBAREA RUNOFF(CFS) =   10.66
   EFFECTIVE AREA(ACRES) =     25.94      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     25.9          PEAK FLOW RATE(CFS) =     37.95

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.36   FLOW VELOCITY(FEET/SEC.) =  6.83
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30707.00 =   1789.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  30707.00 TO NODE  30708.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    432.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   461.00   CHANNEL SLOPE = 0.0499
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -         5.94       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) =      42.04
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.50
   AVERAGE FLOW DEPTH(FEET) = 1.47   TRAVEL TIME(MIN.) =  1.18
   Tc(MIN.) =  13.43
   SUBAREA AREA(ACRES) =     5.94      SUBAREA RUNOFF(CFS) =    8.17
   EFFECTIVE AREA(ACRES) =     31.89      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     31.9          PEAK FLOW RATE(CFS) =     43.86

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.49   FLOW VELOCITY(FEET/SEC.) =  6.58
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30708.00 =   2250.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  30708.00 TO NODE  30709.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    432.00  DOWNSTREAM(FEET) =    422.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE = 0.0588
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.799
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap      SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        13.07       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) =      52.68
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.35
   AVERAGE FLOW DEPTH(FEET) = 1.55   TRAVEL TIME(MIN.) =  0.39
   Tc(MIN.) =  13.81
   SUBAREA AREA(ACRES) =    13.07      SUBAREA RUNOFF(CFS) =   17.64
   EFFECTIVE AREA(ACRES) =     44.95      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     45.0          PEAK FLOW RATE(CFS) =     60.67

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.63   FLOW VELOCITY(FEET/SEC.) =  7.61
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30709.00 =   2420.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30709.00 TO NODE  30710.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    422.00  DOWNSTREAM(FEET) =    377.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1074.00   CHANNEL SLOPE = 0.0419
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.636
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap      SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        19.46       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) =      72.37
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.00
   AVERAGE FLOW DEPTH(FEET) = 1.86   TRAVEL TIME(MIN.) =  2.56
   Tc(MIN.) =  16.37
   SUBAREA AREA(ACRES) =    19.46      SUBAREA RUNOFF(CFS) =   23.39
   EFFECTIVE AREA(ACRES) =     64.41      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     64.4          PEAK FLOW RATE(CFS) =     77.43

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.90   FLOW VELOCITY(FEET/SEC.) =  7.12
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30710.00 =   3494.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30710.00 TO NODE  30711.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    377.00  DOWNSTREAM(FEET) =    345.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   546.00   CHANNEL SLOPE = 0.0586
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.587
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       9.60      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) =     82.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.15
  AVERAGE FLOW DEPTH(FEET) =  1.65   TRAVEL TIME(MIN.) =   0.90
  Tc(MIN.) =   17.27
  SUBAREA AREA(ACRES) =      9.60        SUBAREA RUNOFF(CFS) =   11.12
  EFFECTIVE AREA(ACRES) =     74.01     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       74.0        PEAK FLOW RATE(CFS) =      85.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.67   FLOW VELOCITY(FEET/SEC.) = 10.27
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30711.00 =   4040.00 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       74.0  TC(MIN.) =    17.27
  EFFECTIVE AREA(ACRES) =      74.01  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =        85.75
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
**********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                      Analysis prepared by:

                   Michael Baker International
                 5 Hutton Centre Drive Suite 500
                      Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 8 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 10-YR EV MARCH 2019 CCHIU                                            *
 *********************************************************************

  FILE NAME: X30810EV.DAT
  TIME/DATE OF STUDY: 10:54 03/25/2019
================================================================================
  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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30800.00 TO NODE  30801.00 IS CODE =  21
----------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   324.00
  ELEVATION DATA: UPSTREAM(FEET) =    646.00  DOWNSTREAM(FEET) =    573.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.604
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.207
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap    SCS   Tc
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "CHAPARRAL,BROADLEAF"      -        0.69     0.30     1.000    0   9.60
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       1.18
  TOTAL AREA(ACRES) =       0.69   PEAK FLOW RATE(CFS) =      1.18

*********************************************************************************
  FLOW PROCESS FROM NODE  30801.00 TO NODE  30802.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    573.00  DOWNSTREAM(FEET) =    538.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   104.00    CHANNEL SLOPE = 0.3365
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.172
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap    SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        1.06     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) =      2.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.31
  AVERAGE FLOW DEPTH(FEET) =    0.33    TRAVEL TIME(MIN.) =    0.27
  Tc(MIN.) =    9.88
  SUBAREA AREA(ACRES) =      1.06       SUBAREA RUNOFF(CFS) =    1.79
  EFFECTIVE AREA(ACRES) =      1.75      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         1.8        PEAK FLOW RATE(CFS) =       2.95

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.38    FLOW VELOCITY(FEET/SEC.) =   6.86
  LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30802.00 =    428.00 FEET.

*********************************************************************************
  FLOW PROCESS FROM NODE  30802.00 TO NODE  30803.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    538.00  DOWNSTREAM(FEET) =    500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00    CHANNEL SLOPE = 0.2289
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.122
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
      LAND USE         GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -        1.89      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) =      4.50
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.57
 AVERAGE FLOW DEPTH(FEET) =  0.48   TRAVEL TIME(MIN.) =  0.42
 Tc(MIN.) =  10.30
 SUBAREA AREA(ACRES) =    1.89      SUBAREA RUNOFF(CFS) =   3.10
 EFFECTIVE AREA(ACRES) =    3.64    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) =      5.97

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.53   FLOW VELOCITY(FEET/SEC.) =  7.11
 LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30803.00 =   594.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30803.00 TO NODE  30804.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    500.00 DOWNSTREAM(FEET) =    447.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  284.00  CHANNEL SLOPE = 0.1866
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.050
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
      LAND USE         GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -        3.78      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) =      8.95
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.20
 AVERAGE FLOW DEPTH(FEET) =  0.64   TRAVEL TIME(MIN.) =  0.66
 Tc(MIN.) =  10.96
 SUBAREA AREA(ACRES) =    3.78      SUBAREA RUNOFF(CFS) =   5.96
 EFFECTIVE AREA(ACRES) =    7.43    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       7.4      PEAK FLOW RATE(CFS) =     11.69

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.71   FLOW VELOCITY(FEET/SEC.) =  7.81
 LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30804.00 =   878.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30804.00 TO NODE  30805.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    447.00 DOWNSTREAM(FEET) =    438.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  101.00  CHANNEL SLOPE = 0.0891
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
```

```
*  5 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             -        4.22      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) =     14.97
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.22
 AVERAGE FLOW DEPTH(FEET) =  0.90   TRAVEL TIME(MIN.) =  0.27
 Tc(MIN.) =  11.23
 SUBAREA AREA(ACRES) =    4.22      SUBAREA RUNOFF(CFS) =   6.55
 EFFECTIVE AREA(ACRES) =   11.65    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      11.7      PEAK FLOW RATE(CFS) =     18.05

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.96   FLOW VELOCITY(FEET/SEC.) =  6.55
 LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30805.00 =   979.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30805.00 TO NODE  30806.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    438.00 DOWNSTREAM(FEET) =    419.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  418.00  CHANNEL SLOPE = 0.0455
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.902
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
      LAND USE         GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -        7.15      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) =     23.21
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.42
 AVERAGE FLOW DEPTH(FEET) =  1.19   TRAVEL TIME(MIN.) =  1.29
 Tc(MIN.) =  12.51
 SUBAREA AREA(ACRES) =    7.15      SUBAREA RUNOFF(CFS) =  10.32
 EFFECTIVE AREA(ACRES) =   18.80    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      18.8      PEAK FLOW RATE(CFS) =     27.12

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.26   FLOW VELOCITY(FEET/SEC.) =  5.66
 LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30806.00 =  1397.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30806.00 TO NODE  30807.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    419.00 DOWNSTREAM(FEET) =    395.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  499.00  CHANNEL SLOPE = 0.0481
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.794
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -         9.75      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) =     33.68
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.06
   AVERAGE FLOW DEPTH(FEET) =  1.36   TRAVEL TIME(MIN.) =  1.37
   Tc(MIN.) =  13.89
   SUBAREA AREA(ACRES) =      9.75      SUBAREA RUNOFF(CFS) =  13.11
   EFFECTIVE AREA(ACRES) =      28.56      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      28.6         PEAK FLOW RATE(CFS) =      38.40

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.43   FLOW VELOCITY(FEET/SEC.) =  6.26
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30807.00 =   1896.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  30807.00 TO NODE  30808.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    395.00  DOWNSTREAM(FEET) =    358.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   698.00   CHANNEL SLOPE =  0.0530
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.680
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        10.78      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) =     45.10
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.77
   AVERAGE FLOW DEPTH(FEET) =  1.49   TRAVEL TIME(MIN.) =  1.72
   Tc(MIN.) =  15.60
   SUBAREA AREA(ACRES) =     10.78      SUBAREA RUNOFF(CFS) =  13.39
   EFFECTIVE AREA(ACRES) =      39.33      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      39.3         PEAK FLOW RATE(CFS) =      48.86

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.54   FLOW VELOCITY(FEET/SEC.) =  6.90
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30808.00 =   2594.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  30808.00 TO NODE  30809.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =    332.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   102.00   CHANNEL SLOPE =  0.2549
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.674
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        10.00      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) =     55.04
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 15.94
   AVERAGE FLOW DEPTH(FEET) =  1.07   TRAVEL TIME(MIN.) =   0.11
   Tc(MIN.) =  15.71
   SUBAREA AREA(ACRES) =     10.00      SUBAREA RUNOFF(CFS) =  12.36
   EFFECTIVE AREA(ACRES) =      49.33      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      49.3         PEAK FLOW RATE(CFS) =      61.00

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.12   FLOW VELOCITY(FEET/SEC.) = 16.30
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30809.00 =   2696.00 FEET.
===========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =      49.3   TC(MIN.) =     15.71
   EFFECTIVE AREA(ACRES) =     49.33  AREA-AVERAGED Fm(INCH/HR)= 0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)    =      61.00
===========================================================================
===========================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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

                      Michael Baker International
                    5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 9A EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 10-YR EV MARCH 2019 CCHIU                                            *
 *************************************************************************

  FILE NAME: X39A10EV.DAT
  TIME/DATE OF STUDY: 10:52 03/25/2019
========================================================================
  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  60.0   30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0   25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0   20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0   15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0   10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30900.00 TO NODE  30901.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
  ELEVATION DATA: UPSTREAM(FEET) =    558.00  DOWNSTREAM(FEET) =    510.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.464
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.103
  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  10.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =       0.97
  TOTAL AREA(ACRES) =       0.60   PEAK FLOW RATE(CFS) =       0.97

*************************************************************************
  FLOW PROCESS FROM NODE  30901.00 TO NODE  30902.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    510.00  DOWNSTREAM(FEET) =    470.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  107.00   CHANNEL SLOPE = 0.3738
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        1.02     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) =    1.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.27
  AVERAGE FLOW DEPTH(FEET) =   0.31   TRAVEL TIME(MIN.) =   0.28
  Tc(MIN.) =   10.75
  SUBAREA AREA(ACRES) =     1.02       SUBAREA RUNOFF(CFS) =    1.63
  EFFECTIVE AREA(ACRES) =     1.62     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =      2.59

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   FLOW VELOCITY(FEET/SEC.) =   6.88
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30902.00 =    432.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30902.00 TO NODE  30903.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    445.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  126.00   CHANNEL SLOPE = 0.1984
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.035
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
     LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -         1.53     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) =       3.78
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.94
 AVERAGE FLOW DEPTH(FEET) =  0.46   TRAVEL TIME(MIN.) =   0.35
 Tc(MIN.) =   11.10
 SUBAREA AREA(ACRES) =     1.53      SUBAREA RUNOFF(CFS) =    2.39
 EFFECTIVE AREA(ACRES) =      3.15     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) =       4.92

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.51   FLOW VELOCITY(FEET/SEC.) =  6.39
 LONGEST FLOWPATH FROM NODE 30900.00 TO NODE 30903.00 =   558.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE 30903.00 TO NODE 30904.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   445.00  DOWNSTREAM(FEET) =    404.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  252.00   CHANNEL SLOPE = 0.1627
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.971
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
     LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -         3.07     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) =       7.23
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.53
 AVERAGE FLOW DEPTH(FEET) =  0.61   TRAVEL TIME(MIN.) =   0.64
 Tc(MIN.) =   11.75
 SUBAREA AREA(ACRES) =     3.07      SUBAREA RUNOFF(CFS) =    4.61
 EFFECTIVE AREA(ACRES) =      6.22     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        6.2      PEAK FLOW RATE(CFS) =       9.35

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.67   FLOW VELOCITY(FEET/SEC.) =  6.97
 LONGEST FLOWPATH FROM NODE 30900.00 TO NODE 30904.00 =   810.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE 30904.00 TO NODE 30905.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   404.00  DOWNSTREAM(FEET) =    356.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  544.00   CHANNEL SLOPE = 0.0882
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
*  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.840
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
     LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -         4.76     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) =      12.65
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.95
 AVERAGE FLOW DEPTH(FEET) =  0.84   TRAVEL TIME(MIN.) =   1.52
 Tc(MIN.) =   13.27
 SUBAREA AREA(ACRES) =     4.76      SUBAREA RUNOFF(CFS) =    6.60
 EFFECTIVE AREA(ACRES) =     10.98     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       11.0      PEAK FLOW RATE(CFS) =      15.22

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.90   FLOW VELOCITY(FEET/SEC.) =  6.22
 LONGEST FLOWPATH FROM NODE 30900.00 TO NODE 30905.00 =  1354.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE 30905.00 TO NODE 30906.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   356.00  DOWNSTREAM(FEET) =    332.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  335.00   CHANNEL SLOPE = 0.0716
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.777
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
     LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -        12.78     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) =      23.71
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.49
 AVERAGE FLOW DEPTH(FEET) =  1.10   TRAVEL TIME(MIN.) =   0.86
 Tc(MIN.) =   14.13
 SUBAREA AREA(ACRES) =    12.78      SUBAREA RUNOFF(CFS) =   16.99
 EFFECTIVE AREA(ACRES) =     23.76     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       23.8      PEAK FLOW RATE(CFS) =      31.58

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.23   FLOW VELOCITY(FEET/SEC.) =  6.94
 LONGEST FLOWPATH FROM NODE 30900.00 TO NODE 30906.00 =  1689.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE 30906.00 TO NODE 30907.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   332.00  DOWNSTREAM(FEET) =    305.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  447.00   CHANNEL SLOPE = 0.0604
```

```
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.717
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
USER-DEFINED                -       7.40     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) =      36.29
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.37
AVERAGE FLOW DEPTH(FEET) =   1.20   TRAVEL TIME(MIN.) =   0.89
Tc(MIN.) =   15.02
SUBAREA AREA(ACRES) =      7.40       SUBAREA RUNOFF(CFS) =     9.44
EFFECTIVE AREA(ACRES) =     31.16     AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =      31.2          PEAK FLOW RATE(CFS) =       39.73

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.25   FLOW VELOCITY(FEET/SEC.) =   8.52
LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30907.00 =    2136.00 FEET.
==============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =         31.2  TC(MIN.) =      15.02
EFFECTIVE AREA(ACRES) =      31.16  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)    =       39.73
==============================================================================
==============================================================================
END OF RATIONAL METHOD ANALYSIS
```

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

Michael Baker International
5 Hutton Centre Drive Suite 500
Santa Ana, CA92707

************************** DESCRIPTION OF STUDY **************************
* RMV PA-3 WATERSHED 9B EXISTING CONDITION   *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL   *
* 10-YR EV MARCH 2019 CCHIU   *
 ****

 FILE NAME: X39B10EV.DAT
 TIME/DATE OF STUDY: 10:52 03/25/2019
==
 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 60.0   30.0   0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2 50.0   25.0   0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3 40.0   20.0   0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4 30.0   15.0   0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5 20.0   10.0   0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

 GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth = 0.00 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 30910.00 TO NODE 30911.00 IS CODE = 21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==

 INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
 ELEVATION DATA: UPSTREAM(FEET) =   479.00 DOWNSTREAM(FEET) =   428.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.414
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.109
 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
 "GRASS"   -   0.34   0.30   1.000   0 10.41
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) =   0.55
 TOTAL AREA(ACRES) =   0.34   PEAK FLOW RATE(CFS) =   0.55

****
 FLOW PROCESS FROM NODE 30911.00 TO NODE 30912.00 IS CODE = 51

 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==
 ELEVATION DATA: UPSTREAM(FEET) =   428.00 DOWNSTREAM(FEET) =   380.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   91.00   CHANNEL SLOPE = 0.5275
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.083
 SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
      LAND USE   GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED   -   0.87   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) =   1.25
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.41
 AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   0.24
 Tc(MIN.) =   10.65
 SUBAREA AREA(ACRES) =   0.87   SUBAREA RUNOFF(CFS) =   1.39
 EFFECTIVE AREA(ACRES) =   1.20   AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =   1.2   PEAK FLOW RATE(CFS) =   1.93

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.29   FLOW VELOCITY(FEET/SEC.) =   7.41
 LONGEST FLOWPATH FROM NODE 30910.00 TO NODE 30912.00 =   420.00 FEET.

****
 FLOW PROCESS FROM NODE 30912.00 TO NODE 30913.00 IS CODE = 51

 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==
 ELEVATION DATA: UPSTREAM(FEET) =   380.00 DOWNSTREAM(FEET) =   372.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   91.00   CHANNEL SLOPE = 0.0879
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.042
 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     -
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) =      2.56
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.99
AVERAGE FLOW DEPTH(FEET) =  0.46   TRAVEL TIME(MIN.) =   0.38
Tc(MIN.) =   11.03
SUBAREA AREA(ACRES) =      0.80     SUBAREA RUNOFF(CFS) =   1.26
EFFECTIVE AREA(ACRES) =      2.01    AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =        2.0      PEAK FLOW RATE(CFS) =       3.15

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.50   FLOW VELOCITY(FEET/SEC.) =  4.22
LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30913.00 =     511.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30913.00 TO NODE  30914.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =    355.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   111.00   CHANNEL SLOPE = 0.1532
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.008
 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     -
 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) =      4.15
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.56
 AVERAGE FLOW DEPTH(FEET) =  0.50   TRAVEL TIME(MIN.) =   0.33
 Tc(MIN.) =   11.36
 SUBAREA AREA(ACRES) =      1.30     SUBAREA RUNOFF(CFS) =   2.00
 EFFECTIVE AREA(ACRES) =      3.31    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        3.3      PEAK FLOW RATE(CFS) =       5.09

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.54   FLOW VELOCITY(FEET/SEC.) =  5.85
 LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30914.00 =     622.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30914.00 TO NODE  30915.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    340.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   236.00   CHANNEL SLOPE = 0.0636
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
*   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.926
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        1.86      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) =      6.45
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.50
 AVERAGE FLOW DEPTH(FEET) =  0.69   TRAVEL TIME(MIN.) =   0.87
 Tc(MIN.) =   12.24
 SUBAREA AREA(ACRES) =      1.86     SUBAREA RUNOFF(CFS) =   2.72
 EFFECTIVE AREA(ACRES) =      5.17    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        5.2      PEAK FLOW RATE(CFS) =       7.57

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.74   FLOW VELOCITY(FEET/SEC.) =  4.64
 LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30915.00 =     858.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30915.00 TO NODE  30916.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    340.00  DOWNSTREAM(FEET) =    317.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   366.00   CHANNEL SLOPE = 0.0628
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.823
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        2.39      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) =      9.20
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.84
 AVERAGE FLOW DEPTH(FEET) =  0.80   TRAVEL TIME(MIN.) =   1.26
 Tc(MIN.) =   13.50
 SUBAREA AREA(ACRES) =      2.39     SUBAREA RUNOFF(CFS) =   3.27
 EFFECTIVE AREA(ACRES) =      7.56    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        7.6      PEAK FLOW RATE(CFS) =      10.36

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.83   FLOW VELOCITY(FEET/SEC.) =  5.03
 LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30916.00 =    1224.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30916.00 TO NODE  30917.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    317.00  DOWNSTREAM(FEET) =    295.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   346.00   CHANNEL SLOPE = 0.0636
```

```
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.746
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) =      13.41
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.37
AVERAGE FLOW DEPTH(FEET) =   0.91   TRAVEL TIME(MIN.) =   1.07
Tc(MIN.) =   14.57
SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =    6.12
EFFECTIVE AREA(ACRES) =    12.26     AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =       12.3        PEAK FLOW RATE(CFS) =      15.95

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.97   FLOW VELOCITY(FEET/SEC.) =   5.61
LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30917.00 =    1570.00 FEET.
==============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)       =        12.3  TC(MIN.) =      14.57
EFFECTIVE AREA(ACRES) =      12.26  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)    =       15.95
==============================================================================
==============================================================================
END OF RATIONAL METHOD ANALYSIS
```

```
_____
*************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
            (c) Copyright 1983-2013 Advanced Engineering Software (aes)
              Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                         Analysis prepared by:

                      Michael Baker International
                     5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 10 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 10-YR EV MARCH 2019 CCHIU                                          *
 *********************************************************************

   FILE NAME: X31010EV.DAT
   TIME/DATE OF STUDY: 10:54 03/25/2019
 ================================================================================
   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   60.0    30.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31000.00 TO NODE  31001.00 IS CODE = 21
 --------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ================================================================================
```

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```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
   ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM(FEET) =    455.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.457
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.226
   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
   "GRASS"                   -        0.99    0.30     1.000    0   9.46
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =     1.72
   TOTAL AREA(ACRES) =        0.99   PEAK FLOW RATE(CFS) =      1.72

 *************************************************************************
   FLOW PROCESS FROM NODE  31001.00 TO NODE  31002.00 IS CODE = 51
 --------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    430.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  222.00   CHANNEL SLOPE = 0.1126
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.124
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap    SCS
        LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        1.27    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) =     2.76
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.49
   AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   0.82
   Tc(MIN.) =  10.28
   SUBAREA AREA(ACRES) =     1.27       SUBAREA RUNOFF(CFS) =    2.09
   EFFECTIVE AREA(ACRES) =      2.26     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        2.3         PEAK FLOW RATE(CFS) =      3.72

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.51   FLOW VELOCITY(FEET/SEC.) =   4.83
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31002.00 =     542.00 FEET.

 *************************************************************************
   FLOW PROCESS FROM NODE  31002.00 TO NODE  31003.00 IS CODE = 51
 --------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    430.00  DOWNSTREAM(FEET) =    422.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  159.00   CHANNEL SLOPE = 0.0503
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.048
   SUBAREA LOSS RATE DATA(AMC  II):
```

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```
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE         GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -        1.34     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) =       4.77
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.82
   AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   0.69
   Tc(MIN.) =   10.98
   SUBAREA AREA(ACRES) =     1.34      SUBAREA RUNOFF(CFS) =    2.11
   EFFECTIVE AREA(ACRES) =      3.61    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) =       5.67

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.69   FLOW VELOCITY(FEET/SEC.) =  3.96
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31003.00 =    701.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31003.00 TO NODE  31004.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    422.00  DOWNSTREAM(FEET) =    379.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  506.00   CHANNEL SLOPE = 0.0850
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.923
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE         GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -        2.88     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) =       7.77
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.52
   AVERAGE FLOW DEPTH(FEET) =   0.63   TRAVEL TIME(MIN.) =   1.29
   Tc(MIN.) =   12.27
   SUBAREA AREA(ACRES) =     2.88      SUBAREA RUNOFF(CFS) =    4.20
   EFFECTIVE AREA(ACRES) =      6.48    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) =       9.47

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.68   FLOW VELOCITY(FEET/SEC.) =  6.79
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31004.00 =   1207.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31004.00 TO NODE  31005.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =    365.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  357.00   CHANNEL SLOPE = 0.0392
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
```

```
*   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.831
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE         GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -        2.59     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) =      11.26
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.29
   AVERAGE FLOW DEPTH(FEET) =   0.84   TRAVEL TIME(MIN.) =   1.12
   Tc(MIN.) =   13.39
   SUBAREA AREA(ACRES) =     2.59      SUBAREA RUNOFF(CFS) =    3.57
   EFFECTIVE AREA(ACRES) =      9.07    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        9.1      PEAK FLOW RATE(CFS) =      12.50

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.87   FLOW VELOCITY(FEET/SEC.) =  5.45
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31005.00 =   1564.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31005.00 TO NODE  31006.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    365.00  DOWNSTREAM(FEET) =    334.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  696.00   CHANNEL SLOPE = 0.0445
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.699
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE         GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -        5.86     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) =      16.19
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.09
   AVERAGE FLOW DEPTH(FEET) =   0.94   TRAVEL TIME(MIN.) =   1.90
   Tc(MIN.) =   15.30
   SUBAREA AREA(ACRES) =     5.86      SUBAREA RUNOFF(CFS) =    7.38
   EFFECTIVE AREA(ACRES) =     14.93    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       14.9      PEAK FLOW RATE(CFS) =      18.80

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.99   FLOW VELOCITY(FEET/SEC.) =  6.33
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31006.00 =   2260.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31006.00 TO NODE  31007.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    334.00  DOWNSTREAM(FEET) =    327.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE = 0.0400
```

```
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
*   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.675
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA     Fp        Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
USER-DEFINED              -       33.75     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) =       39.68
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.31
AVERAGE FLOW DEPTH(FEET) =   1.35   TRAVEL TIME(MIN.) =   0.40
Tc(MIN.) =   15.70
 SUBAREA AREA(ACRES) =    33.75      SUBAREA RUNOFF(CFS) =   41.76
 EFFECTIVE AREA(ACRES) =    48.68     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       48.7         PEAK FLOW RATE(CFS) =       60.23

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.57   FLOW VELOCITY(FEET/SEC.) =   8.16
 LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31007.00 =    2435.00 FEET.
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        48.7  TC(MIN.) =       15.70
 EFFECTIVE AREA(ACRES) =      48.68  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       60.23
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
_____
*************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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              Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                          Analysis prepared by:

                        Michael Baker International
                     5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 11 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 10-YR EV MARCH 2019 CCHIU                                          *
 *********************************************************************

   FILE NAME: X31110EV.DAT
   TIME/DATE OF STUDY: 10:54 03/25/2019
=========================================================================
   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  60.0   30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0   25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0   20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0   15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0   10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31100.00 TO NODE  31101.00 IS CODE =  21
-------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =    322.00
   ELEVATION DATA: UPSTREAM(FEET) =    532.00  DOWNSTREAM(FEET) =    475.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.054
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.151
   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"              -        0.34      0.30     1.000     0   10.05
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.57
   TOTAL AREA(ACRES) =       0.34    PEAK FLOW RATE(CFS) =       0.57

*************************************************************************
   FLOW PROCESS FROM NODE  31101.00 TO NODE  31102.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    475.00  DOWNSTREAM(FEET) =    455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    133.00   CHANNEL SLOPE = 0.1504
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.085
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap    SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
   USER-DEFINED              -        0.47      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) =     0.95
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.86
   AVERAGE FLOW DEPTH(FEET) =    0.29   TRAVEL TIME(MIN.) =    0.57
   Tc(MIN.) =   10.63
   SUBAREA AREA(ACRES) =      0.47      SUBAREA RUNOFF(CFS) =     0.76
   EFFECTIVE AREA(ACRES) =       0.82      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =    0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        0.8        PEAK FLOW RATE(CFS) =      1.32

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   4.15
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31102.00 =    455.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31102.00 TO NODE  31103.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    415.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    238.00   CHANNEL SLOPE = 0.1681
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.996
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
  DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
      LAND USE           GROUP      (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -          0.58     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) =       1.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.64
  AVERAGE FLOW DEPTH(FEET) =  0.36   TRAVEL TIME(MIN.) =   0.86
  Tc(MIN.) =  11.48
  SUBAREA AREA(ACRES) =     0.58      SUBAREA RUNOFF(CFS) =    0.89
  EFFECTIVE AREA(ACRES) =      1.40   AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       2.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   FLOW VELOCITY(FEET/SEC.) =  4.82
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31103.00 =     693.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31103.00 TO NODE  31104.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    415.00  DOWNSTREAM(FEET) =    379.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  394.00  CHANNEL SLOPE = 0.0914
  CHANNEL BASE(FEET) =   0.00  "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030  MAXIMUM DEPTH(FEET) = 20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.885
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
      LAND USE           GROUP      (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -          1.61     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) =       3.29
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.34
  AVERAGE FLOW DEPTH(FEET) =  0.45   TRAVEL TIME(MIN.) =   1.23
  Tc(MIN.) =  12.71
  SUBAREA AREA(ACRES) =     1.61      SUBAREA RUNOFF(CFS) =    2.30
  EFFECTIVE AREA(ACRES) =      3.01   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) =       4.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.50   FLOW VELOCITY(FEET/SEC.) =  5.72
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31104.00 =    1087.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31104.00 TO NODE  31105.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =    359.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  388.00  CHANNEL SLOPE = 0.0515
  CHANNEL BASE(FEET) =   0.00  "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030  MAXIMUM DEPTH(FEET) = 20.00
```

```
*  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.792
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
      LAND USE           GROUP      (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -          5.30     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) =       7.86
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.39
  AVERAGE FLOW DEPTH(FEET) =  0.70   TRAVEL TIME(MIN.) =   1.20
  Tc(MIN.) =  13.91
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =    7.11
  EFFECTIVE AREA(ACRES) =      8.31   AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      11.16

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.80   FLOW VELOCITY(FEET/SEC.) =  5.87
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31105.00 =    1475.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31105.00 TO NODE  31106.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    359.00  DOWNSTREAM(FEET) =    345.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  316.00  CHANNEL SLOPE = 0.0443
  CHANNEL BASE(FEET) =   0.00  "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030  MAXIMUM DEPTH(FEET) = 20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.729
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
      LAND USE           GROUP      (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -          2.41     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) =      12.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.74
  AVERAGE FLOW DEPTH(FEET) =  0.86   TRAVEL TIME(MIN.) =   0.92
  Tc(MIN.) =  14.83
  SUBAREA AREA(ACRES) =     2.41      SUBAREA RUNOFF(CFS) =    3.11
  EFFECTIVE AREA(ACRES) =     10.72   AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       10.7       PEAK FLOW RATE(CFS) =      13.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.89   FLOW VELOCITY(FEET/SEC.) =  5.83
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31106.00 =    1791.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31106.00 TO NODE  31107.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    345.00  DOWNSTREAM(FEET) =    336.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  340.00  CHANNEL SLOPE = 0.0265
```

```
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.663
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap     SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -         11.64      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) =     20.93
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.35
  AVERAGE FLOW DEPTH(FEET) = 1.14   TRAVEL TIME(MIN.) = 1.06
  Tc(MIN.) =  15.89
  SUBAREA AREA(ACRES) =    11.64      SUBAREA RUNOFF(CFS) =   14.28
  EFFECTIVE AREA(ACRES) =   22.36     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       22.4         PEAK FLOW RATE(CFS) =     27.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.26   FLOW VELOCITY(FEET/SEC.) = 5.73
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31107.00 =   2131.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31107.00 TO NODE  31108.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    336.00  DOWNSTREAM(FEET) =   325.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  488.00   CHANNEL SLOPE = 0.0225
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.583
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap     SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -          5.13      0.30       0.939    -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.939
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     30.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.54
  AVERAGE FLOW DEPTH(FEET) = 1.35   TRAVEL TIME(MIN.) = 1.47
  Tc(MIN.) =  17.36
  SUBAREA AREA(ACRES) =     5.13      SUBAREA RUNOFF(CFS) =    6.01
  EFFECTIVE AREA(ACRES) =   27.49     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =       27.5         PEAK FLOW RATE(CFS) =     31.82

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.38   FLOW VELOCITY(FEET/SEC.) = 5.60
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31108.00 =   2619.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31108.00 TO NODE  31109.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =   275.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  731.00   CHANNEL SLOPE = 0.0684
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.501
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap     SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -         10.26      0.30       0.934    -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.934
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     37.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.12
  AVERAGE FLOW DEPTH(FEET) = 1.32   TRAVEL TIME(MIN.) = 1.71
  Tc(MIN.) =  19.07
  SUBAREA AREA(ACRES) =    10.26      SUBAREA RUNOFF(CFS) =   11.27
  EFFECTIVE AREA(ACRES) =   37.75     AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =       37.7         PEAK FLOW RATE(CFS) =     41.07

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.37   FLOW VELOCITY(FEET/SEC.) = 7.29
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31109.00 =   3350.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31109.00 TO NODE  31110.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    275.00  DOWNSTREAM(FEET) =   261.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  641.00   CHANNEL SLOPE = 0.0218
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.413
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap     SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -         15.10      0.30       0.985    -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.985
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     48.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.95
  AVERAGE FLOW DEPTH(FEET) = 1.81   TRAVEL TIME(MIN.) = 2.16
  Tc(MIN.) =  21.23
  SUBAREA AREA(ACRES) =    15.10      SUBAREA RUNOFF(CFS) =   15.19
  EFFECTIVE AREA(ACRES) =   52.85     AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =       52.8         PEAK FLOW RATE(CFS) =     53.28

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.87   FLOW VELOCITY(FEET/SEC.) = 5.07
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31110.00 =   3991.00 FEET.
=========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)    =       52.8  TC(MIN.) =    21.23
  EFFECTIVE AREA(ACRES) =    52.85  AREA-AVERAGED Fm(INCH/HR)=  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.977
```

```
   PEAK FLOW RATE(CFS)   =      53.28
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2013 Advanced Engineering Software (aes)
            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                          Analysis prepared by:

                      Michael Baker International
                     5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 12 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 10-YR EV MARCH 2019 CCHIU                                          *
 *********************************************************************

  FILE NAME: X31210EV.DAT
  TIME/DATE OF STUDY: 10:54 03/25/2019
================================================================================
  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  60.0    30.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth =  0.00 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  31200.00 TO NODE  31201.00 IS CODE = 21
------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
  ELEVATION DATA: UPSTREAM(FEET) =    761.00  DOWNSTREAM(FEET) =    639.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.619
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.346
  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"              -        0.91    0.30     1.000    0  8.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     1.67
  TOTAL AREA(ACRES) =       0.91    PEAK FLOW RATE(CFS) =      1.67

************************************************************************
  FLOW PROCESS FROM NODE  31201.00 TO NODE  31202.00 IS CODE = 51
------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    639.00  DOWNSTREAM(FEET) =    595.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE = 0.2009
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.248
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA     Fp       Ap    SCS
       LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -        0.97    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) =     2.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.42
  AVERAGE FLOW DEPTH(FEET) =    0.39    TRAVEL TIME(MIN.) =    0.67
  Tc(MIN.) =    9.29
  SUBAREA AREA(ACRES) =      0.97      SUBAREA RUNOFF(CFS) =    1.69
  EFFECTIVE AREA(ACRES) =      1.88     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.9        PEAK FLOW RATE(CFS) =     3.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43    FLOW VELOCITY(FEET/SEC.) =   5.87
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31202.00 =     540.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE  31202.00 TO NODE  31203.00 IS CODE = 51
------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    595.00  DOWNSTREAM(FEET) =    589.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE = 0.1200
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.228
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         2.51     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) =       5.47
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.47
   AVERAGE FLOW DEPTH(FEET) =  0.58   TRAVEL TIME(MIN.) =   0.15
   Tc(MIN.) =   9.44
   SUBAREA AREA(ACRES) =    2.51      SUBAREA RUNOFF(CFS) =   4.35
   EFFECTIVE AREA(ACRES) =     4.38    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       4.4       PEAK FLOW RATE(CFS) =      7.61

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.65   FLOW VELOCITY(FEET/SEC.) =  5.94
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31203.00 =    590.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31203.00 TO NODE  31204.00 IS CODE =  51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    589.00  DOWNSTREAM(FEET) =    560.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  308.00   CHANNEL SLOPE = 0.0942
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.121
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         4.19     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) =      11.04
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.92
   AVERAGE FLOW DEPTH(FEET) =  0.79   TRAVEL TIME(MIN.) =   0.87
   Tc(MIN.) =  10.31
   SUBAREA AREA(ACRES) =    4.19      SUBAREA RUNOFF(CFS) =   6.87
   EFFECTIVE AREA(ACRES) =     8.57    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) =     14.05

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.86   FLOW VELOCITY(FEET/SEC.) =  6.26
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31204.00 =    898.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31204.00 TO NODE  31205.00 IS CODE =  51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    560.00  DOWNSTREAM(FEET) =    537.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  457.00   CHANNEL SLOPE = 0.0503
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
*   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.975
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         8.19     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) =      20.22
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.46
   AVERAGE FLOW DEPTH(FEET) =  1.11   TRAVEL TIME(MIN.) =   1.39
   Tc(MIN.) =  11.71
   SUBAREA AREA(ACRES) =    8.19      SUBAREA RUNOFF(CFS) =  12.35
   EFFECTIVE AREA(ACRES) =    16.76    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      16.8       PEAK FLOW RATE(CFS) =     25.27

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.21   FLOW VELOCITY(FEET/SEC.) =  5.75
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31205.00 =   1355.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31205.00 TO NODE  31206.00 IS CODE =  51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    537.00  DOWNSTREAM(FEET) =    479.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  780.00   CHANNEL SLOPE = 0.0744
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.823
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -        15.47     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) =      35.89
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.25
   AVERAGE FLOW DEPTH(FEET) =  1.28   TRAVEL TIME(MIN.) =   1.79
   Tc(MIN.) =  13.50
   SUBAREA AREA(ACRES) =   15.47      SUBAREA RUNOFF(CFS) =  21.21
   EFFECTIVE AREA(ACRES) =    32.24    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      32.2       PEAK FLOW RATE(CFS) =     44.18

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.39   FLOW VELOCITY(FEET/SEC.) =  7.67
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31206.00 =   2135.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31206.00 TO NODE  31207.00 IS CODE =  51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    479.00  DOWNSTREAM(FEET) =    455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  551.00   CHANNEL SLOPE = 0.0436
```

```
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.730
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/       SCS SOIL     AREA        Fp         Ap       SCS
           LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED                -        37.81      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) =     68.53
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.01
     AVERAGE FLOW DEPTH(FEET) =  1.81   TRAVEL TIME(MIN.) =  1.31
     Tc(MIN.) =  14.81
     SUBAREA AREA(ACRES) =   37.81       SUBAREA RUNOFF(CFS) =   48.67
     EFFECTIVE AREA(ACRES) =    70.05      AREA-AVERAGED Fm(INCH/HR) =   0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =       70.1          PEAK FLOW RATE(CFS) =       90.18

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 2.00   FLOW VELOCITY(FEET/SEC.) =  7.49
     LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31207.00 =   2686.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31207.00 TO NODE  31208.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
     ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    434.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =   743.00   CHANNEL SLOPE = 0.0283
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.617
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/       SCS SOIL     AREA        Fp         Ap       SCS
           LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED                -        18.18      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) =    100.96
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.54
     AVERAGE FLOW DEPTH(FEET) =  2.27   TRAVEL TIME(MIN.) =  1.89
     Tc(MIN.) =  16.70
     SUBAREA AREA(ACRES) =   18.18       SUBAREA RUNOFF(CFS) =   21.56
     EFFECTIVE AREA(ACRES) =    88.23      AREA-AVERAGED Fm(INCH/HR) =   0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =       88.2          PEAK FLOW RATE(CFS) =      104.60

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 2.29   FLOW VELOCITY(FEET/SEC.) =  6.63
     LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31208.00 =   3429.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31208.00 TO NODE  31209.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
```

```
     ELEVATION DATA: UPSTREAM(FEET) =    434.00  DOWNSTREAM(FEET) =    410.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =   899.00   CHANNEL SLOPE = 0.0267
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.508
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/       SCS SOIL     AREA        Fp         Ap       SCS
           LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED                -        42.09      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) =    127.49
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.80
     AVERAGE FLOW DEPTH(FEET) =  2.50   TRAVEL TIME(MIN.) =  2.20
     Tc(MIN.) =  18.91
     SUBAREA AREA(ACRES) =   42.09       SUBAREA RUNOFF(CFS) =   45.77
     EFFECTIVE AREA(ACRES) =   130.32      AREA-AVERAGED Fm(INCH/HR) =   0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =      130.3          PEAK FLOW RATE(CFS) =      141.74

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 2.60   FLOW VELOCITY(FEET/SEC.) =  7.00
     LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31209.00 =   4328.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31209.00 TO NODE  31210.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
     ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    390.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =   724.00   CHANNEL SLOPE = 0.0276
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.439
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/       SCS SOIL     AREA        Fp         Ap       SCS
           LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED                -        27.15      0.30       0.999      -
     SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
     SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.999
     TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    155.65
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.25
     AVERAGE FLOW DEPTH(FEET) =  2.68   TRAVEL TIME(MIN.) =  1.66
     Tc(MIN.) =  20.57
     SUBAREA AREA(ACRES) =   27.15       SUBAREA RUNOFF(CFS) =   27.83
     EFFECTIVE AREA(ACRES) =   157.48      AREA-AVERAGED Fm(INCH/HR) =   0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =      157.5          PEAK FLOW RATE(CFS) =      161.38

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 2.71   FLOW VELOCITY(FEET/SEC.) =  7.31
     LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31210.00 =   5052.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31210.00 TO NODE  31211.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     390.00  DOWNSTREAM(FEET) =     364.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1073.00   CHANNEL SLOPE = 0.0242
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.347
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED                 -        15.95     0.30      0.963     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.963
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    168.98
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.04
   AVERAGE FLOW DEPTH(FEET) = 2.83   TRAVEL TIME(MIN.) =   2.54
   Tc(MIN.) =   23.11
   SUBAREA AREA(ACRES) =     15.95       SUBAREA RUNOFF(CFS) =   15.20
   EFFECTIVE AREA(ACRES) =    173.43     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       173.4       PEAK FLOW RATE(CFS) =     163.67

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.80   FLOW VELOCITY(FEET/SEC.) =  6.98
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31211.00 =   6125.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  31211.00 TO NODE  31212.00 IS CODE = 51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     364.00  DOWNSTREAM(FEET) =     318.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1175.00   CHANNEL SLOPE = 0.0391
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 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                 -        81.12     0.30      0.928     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.928
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    200.22
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.78
   AVERAGE FLOW DEPTH(FEET) = 2.76   TRAVEL TIME(MIN.) =   2.23
   Tc(MIN.) =   25.34
   SUBAREA AREA(ACRES) =     81.12       SUBAREA RUNOFF(CFS) =   73.09
   EFFECTIVE AREA(ACRES) =    254.55     AREA-AVERAGED Fm(INCH/HR) =   0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.97
   TOTAL AREA(ACRES) =       254.5       PEAK FLOW RATE(CFS) =     226.15

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.89   FLOW VELOCITY(FEET/SEC.) =  9.05
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31212.00 =   7300.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  31212.00 TO NODE  31213.00 IS CODE = 51
```

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--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     318.00  DOWNSTREAM(FEET) =     317.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  506.00   CHANNEL SLOPE = 0.0020
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.206
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED                 -         1.00     0.30      0.850     -
   USER-DEFINED                 -        28.30     0.30      1.000     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.995
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    238.11
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.00
   AVERAGE FLOW DEPTH(FEET) = 5.15   TRAVEL TIME(MIN.) =   2.81
   Tc(MIN.) =   28.16
   SUBAREA AREA(ACRES) =     29.30       SUBAREA RUNOFF(CFS) =   23.93
   EFFECTIVE AREA(ACRES) =    283.85     AREA-AVERAGED Fm(INCH/HR) =   0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.98
   TOTAL AREA(ACRES) =       283.8       PEAK FLOW RATE(CFS) =     233.23

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 5.11   FLOW VELOCITY(FEET/SEC.) =  2.98
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31213.00 =   7806.00 FEET.
================================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =      283.8  TC(MIN.) =     28.16
   EFFECTIVE AREA(ACRES) =    283.85  AREA-AVERAGED Fm(INCH/HR)= 0.29
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.977
   PEAK FLOW RATE(CFS)    =      233.23
================================================================================
================================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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

                    Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 13 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 10-YR EV MARCH 2019 CCHIU                                             *
 *************************************************************************

  FILE NAME: X31310EV.DAT
  TIME/DATE OF STUDY: 10:55 03/25/2019
========================================================================
  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   60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31300.00 TO NODE  31301.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
  ELEVATION DATA: UPSTREAM(FEET) =    535.00  DOWNSTREAM(FEET) =     490.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.423
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.108
  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
  "GRASS"                  -        0.53     0.30     1.000     0  10.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.86
  TOTAL AREA(ACRES) =       0.53   PEAK FLOW RATE(CFS) =       0.86

************************************************************************
  FLOW PROCESS FROM NODE  31301.00 TO NODE  31302.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    480.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00   CHANNEL SLOPE = 0.0746
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.037
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS
       LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED             -        1.00     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) =     1.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.39
  AVERAGE FLOW DEPTH(FEET) =   0.40    TRAVEL TIME(MIN.) =   0.66
  Tc(MIN.) =   11.08
  SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    1.57
  EFFECTIVE AREA(ACRES) =      1.53      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =      2.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.46   FLOW VELOCITY(FEET/SEC.) =   3.72
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31302.00 =     450.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE  31302.00 TO NODE  31303.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    480.00  DOWNSTREAM(FEET) =    469.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   237.00   CHANNEL SLOPE = 0.0464
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.927
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
       DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED               -        1.63     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) =      3.59
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.43
     AVERAGE FLOW DEPTH(FEET) =  0.59   TRAVEL TIME(MIN.) =  1.15
     Tc(MIN.) =  12.23
     SUBAREA AREA(ACRES) =     1.63      SUBAREA RUNOFF(CFS) =    2.39
     EFFECTIVE AREA(ACRES) =      3.16    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) =       4.63

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 0.65   FLOW VELOCITY(FEET/SEC.) =  3.64
     LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31303.00 =    687.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31303.00 TO NODE  31304.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   469.00  DOWNSTREAM(FEET) =    418.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   483.00   CHANNEL SLOPE = 0.1056
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.807
   SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED               -        3.16     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) =      6.77
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.45
     AVERAGE FLOW DEPTH(FEET) =  0.64   TRAVEL TIME(MIN.) =  1.48
     Tc(MIN.) =  13.71
     SUBAREA AREA(ACRES) =     3.16      SUBAREA RUNOFF(CFS) =    4.29
     EFFECTIVE AREA(ACRES) =      6.32    AREA-AVERAGED Fm(INCH/HR) =  0.30
     AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =        6.3      PEAK FLOW RATE(CFS) =       8.58

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 0.70   FLOW VELOCITY(FEET/SEC.) =  5.76
     LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31304.00 =   1170.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31304.00 TO NODE  31305.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   418.00  DOWNSTREAM(FEET) =    381.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   469.00   CHANNEL SLOPE = 0.0789
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
*   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.717
   SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED               -       10.56     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) =     15.31
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.03
     AVERAGE FLOW DEPTH(FEET) =  0.92   TRAVEL TIME(MIN.) =  1.30
     Tc(MIN.) =  15.01
     SUBAREA AREA(ACRES) =    10.56      SUBAREA RUNOFF(CFS) =   13.47
     EFFECTIVE AREA(ACRES) =     16.88    AREA-AVERAGED Fm(INCH/HR) =  0.30
     AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =       16.9      PEAK FLOW RATE(CFS) =      21.54

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 1.05   FLOW VELOCITY(FEET/SEC.) =  6.54
     LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31305.00 =   1639.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31305.00 TO NODE  31306.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   381.00  DOWNSTREAM(FEET) =    363.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   398.00   CHANNEL SLOPE = 0.0452
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.662
   SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED               -       19.15     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) =     33.28
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.32
     AVERAGE FLOW DEPTH(FEET) =  1.23   TRAVEL TIME(MIN.) =  0.91
     Tc(MIN.) =  15.91
     SUBAREA AREA(ACRES) =    19.15      SUBAREA RUNOFF(CFS) =   23.47
     EFFECTIVE AREA(ACRES) =     36.03    AREA-AVERAGED Fm(INCH/HR) =  0.30
     AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =       36.0      PEAK FLOW RATE(CFS) =      44.17

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 1.37   FLOW VELOCITY(FEET/SEC.) =  7.86
     LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31306.00 =   2037.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31306.00 TO NODE  31307.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   363.00  DOWNSTREAM(FEET) =    313.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   836.00   CHANNEL SLOPE = 0.0598
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.578
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        13.40      0.30      0.998     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.998
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     51.88
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.13
   AVERAGE FLOW DEPTH(FEET) =  1.38   TRAVEL TIME(MIN.) =  1.53
   Tc(MIN.) =  17.44
   SUBAREA AREA(ACRES) =   13.40       SUBAREA RUNOFF(CFS) =  15.42
   EFFECTIVE AREA(ACRES) =     49.43      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      49.4        PEAK FLOW RATE(CFS) =     56.89

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.42   FLOW VELOCITY(FEET/SEC.) =  9.35
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31307.00 =   2873.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  31307.00 TO NODE  31308.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    313.00  DOWNSTREAM(FEET) =    302.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  763.00   CHANNEL SLOPE = 0.0144
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.474
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        11.99      0.30      0.998     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.998
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     63.23
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.63
   AVERAGE FLOW DEPTH(FEET) =  1.94   TRAVEL TIME(MIN.) =  2.26
   Tc(MIN.) =  19.70
   SUBAREA AREA(ACRES) =   11.99       SUBAREA RUNOFF(CFS) =  12.68
   EFFECTIVE AREA(ACRES) =     61.43      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      61.4        PEAK FLOW RATE(CFS) =     64.92

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.96   FLOW VELOCITY(FEET/SEC.) =  5.66
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31308.00 =   3636.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  31308.00 TO NODE  31309.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    302.00  DOWNSTREAM(FEET) =    289.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1009.00   CHANNEL SLOPE = 0.0129
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.362
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        21.83      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) =     75.35
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.64
   AVERAGE FLOW DEPTH(FEET) =  2.11   TRAVEL TIME(MIN.) =  2.98
   Tc(MIN.) =  22.68
   SUBAREA AREA(ACRES) =   21.83       SUBAREA RUNOFF(CFS) =  20.86
   EFFECTIVE AREA(ACRES) =     83.25      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      83.3        PEAK FLOW RATE(CFS) =     79.57

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.16   FLOW VELOCITY(FEET/SEC.) =  5.70
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31309.00 =   4645.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  31309.00 TO NODE  31310.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    289.00  DOWNSTREAM(FEET) =    275.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  628.00   CHANNEL SLOPE = 0.0223
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.316
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        37.10      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) =     96.54
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.34
   AVERAGE FLOW DEPTH(FEET) =  2.09   TRAVEL TIME(MIN.) =  1.43
   Tc(MIN.) =  24.11
   SUBAREA AREA(ACRES) =   37.10       SUBAREA RUNOFF(CFS) =  33.92
   EFFECTIVE AREA(ACRES) =    120.35      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     120.4        PEAK FLOW RATE(CFS) =    110.06

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.19   FLOW VELOCITY(FEET/SEC.) =  7.62
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31310.00 =   5273.00 FEET.
=======================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =     120.4  TC(MIN.) =     24.11
   EFFECTIVE AREA(ACRES) =    120.35  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.000
```

```
   PEAK FLOW RATE(CFS)    =      110.06
================================================================================
================================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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

                      Michael Baker International
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                         Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 14 EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 10-YR EV MARCH 2019 CCHIU                                            *
 **********************************************************************

   FILE NAME: X31410EV.DAT
   TIME/DATE OF STUDY: 10:55 03/25/2019
 ==================================================================
   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   60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31400.00 TO NODE  31401.00 IS CODE =  21
 ----------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =    327.00
   ELEVATION DATA: UPSTREAM(FEET) =    868.00  DOWNSTREAM(FEET) =    772.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.143
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.269
   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
   "CHAPARRAL,NARROWLEAF"    -       0.99     0.30    1.000     0   9.14
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      1.75
   TOTAL AREA(ACRES) =       0.99   PEAK FLOW RATE(CFS) =      1.75

 ******************************************************************
   FLOW PROCESS FROM NODE  31401.00 TO NODE  31402.00 IS CODE =  51
 ----------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    772.00  DOWNSTREAM(FEET) =    750.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00   CHANNEL SLOPE = 0.1642
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.211
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA     Fp       Ap     SCS
        LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -       1.23     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) =     2.81
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.20
   AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =   0.43
   Tc(MIN.) =   9.57
   SUBAREA AREA(ACRES) =     1.23      SUBAREA RUNOFF(CFS) =    2.11
   EFFECTIVE AREA(ACRES) =     2.21     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       2.2       PEAK FLOW RATE(CFS) =     3.81

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.48   FLOW VELOCITY(FEET/SEC.) =   5.61
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31402.00 =    461.00 FEET.

 ******************************************************************
   FLOW PROCESS FROM NODE  31402.00 TO NODE  31403.00 IS CODE =  51
 ----------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    750.00  DOWNSTREAM(FEET) =    710.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE = 0.1258
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.093
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         1.42      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) =       4.96
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.38
  AVERAGE FLOW DEPTH(FEET) =  0.55   TRAVEL TIME(MIN.) =   0.98
  Tc(MIN.) =   10.56
  SUBAREA AREA(ACRES) =      1.42      SUBAREA RUNOFF(CFS) =    2.29
  EFFECTIVE AREA(ACRES) =       3.64     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) =       5.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.59   FLOW VELOCITY(FEET/SEC.) =  5.61
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31403.00 =    779.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  31403.00 TO NODE  31404.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    710.00  DOWNSTREAM(FEET) =    688.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   181.00   CHANNEL SLOPE =  0.1215
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.038
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         1.91      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) =       7.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.89
  AVERAGE FLOW DEPTH(FEET) =  0.65   TRAVEL TIME(MIN.) =   0.51
  Tc(MIN.) =   11.07
  SUBAREA AREA(ACRES) =      1.91      SUBAREA RUNOFF(CFS) =    2.98
  EFFECTIVE AREA(ACRES) =       5.55     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         5.5        PEAK FLOW RATE(CFS) =       8.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.69   FLOW VELOCITY(FEET/SEC.) =  6.08
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31404.00 =    960.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  31404.00 TO NODE  31405.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    688.00  DOWNSTREAM(FEET) =    675.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   237.00   CHANNEL SLOPE =  0.0549
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.958
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         2.67      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) =      10.66
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.81
  AVERAGE FLOW DEPTH(FEET) =  0.86   TRAVEL TIME(MIN.) =   0.82
  Tc(MIN.) =   11.89
  SUBAREA AREA(ACRES) =      2.67      SUBAREA RUNOFF(CFS) =    3.98
  EFFECTIVE AREA(ACRES) =       8.21     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         8.2        PEAK FLOW RATE(CFS) =      12.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.91   FLOW VELOCITY(FEET/SEC.) =  4.99
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31405.00 =   1197.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  31405.00 TO NODE  31406.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =    668.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    78.00   CHANNEL SLOPE =  0.0897
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   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             -         7.51      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) =      17.80
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.56
  AVERAGE FLOW DEPTH(FEET) =  0.95   TRAVEL TIME(MIN.) =   0.20
  Tc(MIN.) =   12.09
  SUBAREA AREA(ACRES) =      7.51      SUBAREA RUNOFF(CFS) =   11.09
  EFFECTIVE AREA(ACRES) =      15.73     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        15.7        PEAK FLOW RATE(CFS) =      23.21

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.05   FLOW VELOCITY(FEET/SEC.) =  7.02
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31406.00 =   1275.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  31406.00 TO NODE  31407.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    668.00  DOWNSTREAM(FEET) =    640.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0502
```

```
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.813
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -         9.79     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) =      29.87
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.02
   AVERAGE FLOW DEPTH(FEET) =  1.29   TRAVEL TIME(MIN.) =  1.55
   Tc(MIN.) =  13.63
   SUBAREA AREA(ACRES) =      9.79       SUBAREA RUNOFF(CFS) =  13.33
   EFFECTIVE AREA(ACRES) =     25.52      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     25.5         PEAK FLOW RATE(CFS) =      34.74

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.36   FLOW VELOCITY(FEET/SEC.) =  6.24
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31407.00 =   1833.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  31407.00 TO NODE  31408.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    607.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    710.00   CHANNEL SLOPE = 0.0465
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.690
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        18.46     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) =      46.29
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.52
   AVERAGE FLOW DEPTH(FEET) =  1.54   TRAVEL TIME(MIN.) =  1.81
   Tc(MIN.) =  15.45
   SUBAREA AREA(ACRES) =     18.46       SUBAREA RUNOFF(CFS) =  23.09
   EFFECTIVE AREA(ACRES) =     43.97      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     44.0         PEAK FLOW RATE(CFS) =      55.00

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.64   FLOW VELOCITY(FEET/SEC.) =  6.79
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31408.00 =   2543.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  31408.00 TO NODE  31409.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    607.00  DOWNSTREAM(FEET) =    574.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    674.00   CHANNEL SLOPE = 0.0490
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.600
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -         9.15     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) =      60.36
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.10
   AVERAGE FLOW DEPTH(FEET) =  1.68   TRAVEL TIME(MIN.) =  1.58
   Tc(MIN.) =  17.03
   SUBAREA AREA(ACRES) =      9.15       SUBAREA RUNOFF(CFS) =  10.71
   EFFECTIVE AREA(ACRES) =     53.13      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     53.1         PEAK FLOW RATE(CFS) =      62.15

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.70   FLOW VELOCITY(FEET/SEC.) =  7.13
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31409.00 =   3217.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  31409.00 TO NODE  31410.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =    540.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    817.00   CHANNEL SLOPE = 0.0416
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -        54.88     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) =      92.04
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.41
   AVERAGE FLOW DEPTH(FEET) =  2.03   TRAVEL TIME(MIN.) =  1.84
   Tc(MIN.) =  18.87
   SUBAREA AREA(ACRES) =     54.88       SUBAREA RUNOFF(CFS) =  59.77
   EFFECTIVE AREA(ACRES) =    108.01      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =    108.0         PEAK FLOW RATE(CFS) =     117.64

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.23   FLOW VELOCITY(FEET/SEC.) =  7.87
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31410.00 =   4034.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  31410.00 TO NODE  31411.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    500.00
    CHANNEL LENGTH THRU SUBAREA(FEET) = 1364.00   CHANNEL SLOPE = 0.0293
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.384
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED                -        40.22     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) =    137.27
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    7.19
    AVERAGE FLOW DEPTH(FEET) =  2.52   TRAVEL TIME(MIN.) =   3.16
    Tc(MIN.) =  22.03
    SUBAREA AREA(ACRES) =    40.22       SUBAREA RUNOFF(CFS) =   39.25
    EFFECTIVE AREA(ACRES) =    148.22     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =      148.2      PEAK FLOW RATE(CFS) =     144.65

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 2.58   FLOW VELOCITY(FEET/SEC.) =  7.27
    LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31411.00 =    5398.00 FEET.

*******************************************************************************
    FLOW PROCESS FROM NODE  31411.00 TO NODE  31412.00 IS CODE = 51
-------------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    468.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  985.00   CHANNEL SLOPE = 0.0325
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.317
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED                -       100.09     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) =    190.49
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    8.08
    AVERAGE FLOW DEPTH(FEET) =  2.80   TRAVEL TIME(MIN.) =   2.03
    Tc(MIN.) =  24.06
    SUBAREA AREA(ACRES) =   100.09       SUBAREA RUNOFF(CFS) =   91.65
    EFFECTIVE AREA(ACRES) =    248.31     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =      248.3      PEAK FLOW RATE(CFS) =     227.37

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 2.99   FLOW VELOCITY(FEET/SEC.) =  8.46
    LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31412.00 =    6383.00 FEET.

*******************************************************************************
    FLOW PROCESS FROM NODE  31412.00 TO NODE  31413.00 IS CODE = 51
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-------------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    468.00  DOWNSTREAM(FEET) =    428.00
    CHANNEL LENGTH THRU SUBAREA(FEET) = 1135.00   CHANNEL SLOPE = 0.0352
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.256
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED                -        56.18     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) =    251.55
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    8.94
    AVERAGE FLOW DEPTH(FEET) =  3.06   TRAVEL TIME(MIN.) =   2.12
    Tc(MIN.) =  26.18
    SUBAREA AREA(ACRES) =    56.18       SUBAREA RUNOFF(CFS) =   48.36
    EFFECTIVE AREA(ACRES) =    304.49     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =      304.5      PEAK FLOW RATE(CFS) =     262.11

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 3.11   FLOW VELOCITY(FEET/SEC.) =  9.03
    LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31413.00 =    7518.00 FEET.

*******************************************************************************
    FLOW PROCESS FROM NODE  31413.00 TO NODE  31414.00 IS CODE = 51
-------------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    428.00  DOWNSTREAM(FEET) =    394.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  888.00   CHANNEL SLOPE = 0.0383
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   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                -        35.49     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) =    276.74
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    9.44
    AVERAGE FLOW DEPTH(FEET) =  3.13   TRAVEL TIME(MIN.) =   1.57
    Tc(MIN.) =  27.74
    SUBAREA AREA(ACRES) =    35.49       SUBAREA RUNOFF(CFS) =   29.26
    EFFECTIVE AREA(ACRES) =    339.98     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =      340.0      PEAK FLOW RATE(CFS) =     280.30

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 3.14   FLOW VELOCITY(FEET/SEC.) =  9.49
    LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31414.00 =    8406.00 FEET.
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***************************************************************************
   FLOW PROCESS FROM NODE  31414.00 TO NODE  31415.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    394.00  DOWNSTREAM(FEET) =    368.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1044.00   CHANNEL SLOPE = 0.0249
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.166
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -         26.50     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) =     290.63
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.13
   AVERAGE FLOW DEPTH(FEET) =  3.45   TRAVEL TIME(MIN.) =  2.14
   Tc(MIN.) =  29.88
   SUBAREA AREA(ACRES) =   26.50      SUBAREA RUNOFF(CFS) =  20.66
   EFFECTIVE AREA(ACRES) =   366.48     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     366.5        PEAK FLOW RATE(CFS) =     285.74

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  3.43   FLOW VELOCITY(FEET/SEC.) =  8.10
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31415.00 =   9450.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31415.00 TO NODE  31416.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    368.00  DOWNSTREAM(FEET) =    334.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1318.00   CHANNEL SLOPE = 0.0258
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.112
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -         52.53     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) =     304.94
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.35
   AVERAGE FLOW DEPTH(FEET) =  3.49   TRAVEL TIME(MIN.) =  2.63
   Tc(MIN.) =  32.51
   SUBAREA AREA(ACRES) =   52.53      SUBAREA RUNOFF(CFS) =  38.40
   EFFECTIVE AREA(ACRES) =   419.00     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     419.0        PEAK FLOW RATE(CFS) =     306.32

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  3.50   FLOW VELOCITY(FEET/SEC.) =  8.35

   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31416.00 =  10768.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31416.00 TO NODE  31417.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    334.00  DOWNSTREAM(FEET) =    325.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1012.00   CHANNEL SLOPE = 0.0089
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 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            -         16.45     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) =     311.94
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.63
   AVERAGE FLOW DEPTH(FEET) =  4.30   TRAVEL TIME(MIN.) =  3.00
   Tc(MIN.) =  35.51
   SUBAREA AREA(ACRES) =   16.45      SUBAREA RUNOFF(CFS) =  11.23
   EFFECTIVE AREA(ACRES) =   435.46     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     435.5        PEAK FLOW RATE(CFS) =     306.32
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  4.27   FLOW VELOCITY(FEET/SEC.) =  5.61
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31417.00 =  11780.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31417.00 TO NODE  31418.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =    301.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1232.00   CHANNEL SLOPE = 0.0195
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.016
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED            -         13.50     0.30     0.694      -
   USER-DEFINED            -         32.00     0.30     1.000      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.909
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     321.54
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.62
   AVERAGE FLOW DEPTH(FEET) =  3.75   TRAVEL TIME(MIN.) =  2.70
   Tc(MIN.) =  38.21
   SUBAREA AREA(ACRES) =   45.50      SUBAREA RUNOFF(CFS) =  30.43
   EFFECTIVE AREA(ACRES) =   480.96     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.99
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   TOTAL AREA(ACRES) =       481.0        PEAK FLOW RATE(CFS) =       311.00

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.71   FLOW VELOCITY(FEET/SEC.) =   7.55
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31418.00 =   13012.00 FEET.
================================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =      481.0   TC(MIN.) =      38.21
   EFFECTIVE AREA(ACRES) =     480.96  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.991
   PEAK FLOW RATE(CFS)   =       311.00
================================================================================
================================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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

                     Michael Baker International
                    5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 15 EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 10-YR EV MARCH 2019 CCHIU                                            *
 ***********************************************************************

  FILE NAME: X31510EV.DAT
  TIME/DATE OF STUDY: 10:55 03/25/2019
====================================================================
  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  60.0    30.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth =  0.00 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  31500.00 TO NODE  31501.00 IS CODE =  21
--------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
====================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    326.00
  ELEVATION DATA: UPSTREAM(FEET) =    416.00  DOWNSTREAM(FEET) =     379.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.043
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.041
  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
  "GRASS"                    -        0.66     0.30     1.000    0  11.04
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.03
  TOTAL AREA(ACRES) =       0.66   PEAK FLOW RATE(CFS) =      1.03

************************************************************************
  FLOW PROCESS FROM NODE  31501.00 TO NODE  31502.00 IS CODE =  51
--------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =    375.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  179.00   CHANNEL SLOPE = 0.0223
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.907
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap    SCS
        LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        0.74     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) =     1.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.11
  AVERAGE FLOW DEPTH(FEET) =   0.50    TRAVEL TIME(MIN.) =   1.42
  Tc(MIN.) =   12.46
  SUBAREA AREA(ACRES) =     0.74       SUBAREA RUNOFF(CFS) =    1.07
  EFFECTIVE AREA(ACRES) =      1.40       AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         1.4         PEAK FLOW RATE(CFS) =      2.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   2.26
  LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31502.00 =     505.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE  31502.00 TO NODE  31503.00 IS CODE =  51
--------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    375.00  DOWNSTREAM(FEET) =    374.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  151.00   CHANNEL SLOPE = 0.0066
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.780
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
   LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
USER-DEFINED             -         1.23     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) =       2.84
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.55
AVERAGE FLOW DEPTH(FEET) =  0.78   TRAVEL TIME(MIN.) =  1.62
Tc(MIN.) =  14.08
SUBAREA AREA(ACRES) =     1.23      SUBAREA RUNOFF(CFS) =    1.63
EFFECTIVE AREA(ACRES) =      2.63     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) =       3.50

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.84   FLOW VELOCITY(FEET/SEC.) =  1.64
LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31503.00 =    656.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE 31503.00 TO NODE 31504.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    374.00  DOWNSTREAM(FEET) =    372.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  184.00   CHANNEL SLOPE = 0.0109
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED            -         2.17     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) =       4.85
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.15
  AVERAGE FLOW DEPTH(FEET) =  0.87   TRAVEL TIME(MIN.) =  1.42
  Tc(MIN.) =  15.50
  SUBAREA AREA(ACRES) =     2.17      SUBAREA RUNOFF(CFS) =    2.71
  EFFECTIVE AREA(ACRES) =      4.80     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        4.8      PEAK FLOW RATE(CFS) =       5.98

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.94   FLOW VELOCITY(FEET/SEC.) =  2.25
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31504.00 =    840.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE 31504.00 TO NODE 31505.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =    360.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  268.00   CHANNEL SLOPE = 0.0448
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
*   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.624
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED            -         2.94     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) =       7.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.13
  AVERAGE FLOW DEPTH(FEET) =  0.79   TRAVEL TIME(MIN.) =  1.08
  Tc(MIN.) =  16.59
  SUBAREA AREA(ACRES) =     2.94      SUBAREA RUNOFF(CFS) =    3.50
  EFFECTIVE AREA(ACRES) =      7.74     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        7.7      PEAK FLOW RATE(CFS) =       9.22

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.85   FLOW VELOCITY(FEET/SEC.) =  4.26
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31505.00 =   1108.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE 31505.00 TO NODE 31506.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    360.00  DOWNSTREAM(FEET) =    320.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  622.00   CHANNEL SLOPE = 0.0643
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.525
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED            -         6.03     0.30     0.984     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.984
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.29
  AVERAGE FLOW DEPTH(FEET) =  0.89   TRAVEL TIME(MIN.) =  1.96
  Tc(MIN.) =  18.55
  SUBAREA AREA(ACRES) =     6.03      SUBAREA RUNOFF(CFS) =    6.67
  EFFECTIVE AREA(ACRES) =     13.77     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   0.99
  TOTAL AREA(ACRES) =       13.8      PEAK FLOW RATE(CFS) =      15.20

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.96   FLOW VELOCITY(FEET/SEC.) =  5.54
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31506.00 =   1730.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE 31506.00 TO NODE 31507.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    320.00  DOWNSTREAM(FEET) =    315.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  391.00   CHANNEL SLOPE = 0.0128
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.452
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE              GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED                -        2.67      0.30      0.611     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.611
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     16.72
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.85
   AVERAGE FLOW DEPTH(FEET) = 1.20   TRAVEL TIME(MIN.) =  1.69
   Tc(MIN.) =  20.24
   SUBAREA AREA(ACRES) =    2.67      SUBAREA RUNOFF(CFS) =    3.04
   EFFECTIVE AREA(ACRES) =     16.43      AREA-AVERAGED Fm(INCH/HR) =  0.28
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  0.93
   TOTAL AREA(ACRES) =       16.4          PEAK FLOW RATE(CFS) =     17.34

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.22   FLOW VELOCITY(FEET/SEC.) = 3.90
   LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31507.00 =   2121.00 FEET.


**************************************************************************
  FLOW PROCESS FROM NODE  31507.00 TO NODE  31508.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    315.00  DOWNSTREAM(FEET) =    313.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    427.00   CHANNEL SLOPE = 0.0047
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   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                -       10.20      0.30      0.527     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     22.86
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 2.87
   AVERAGE FLOW DEPTH(FEET) =  1.63   TRAVEL TIME(MIN.) =   2.48
   Tc(MIN.) =  22.72
   SUBAREA AREA(ACRES) =   10.20      SUBAREA RUNOFF(CFS) =   11.03
   EFFECTIVE AREA(ACRES) =     26.63      AREA-AVERAGED Fm(INCH/HR) =   0.23
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.78
   TOTAL AREA(ACRES) =       26.6          PEAK FLOW RATE(CFS) =     27.02

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.74   FLOW VELOCITY(FEET/SEC.) = 2.99
   LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31508.00 =   2548.00 FEET.


**************************************************************************
  FLOW PROCESS FROM NODE  31508.00 TO NODE  31509.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    313.00  DOWNSTREAM(FEET) =    296.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    495.00   CHANNEL SLOPE = 0.0343
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.321
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE              GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED                -        8.30      0.30      1.000     -
   USER-DEFINED                -       10.50      0.30      0.500     -
   USER-DEFINED                -        1.60      0.30      0.850     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.731
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     37.14
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.82
   AVERAGE FLOW DEPTH(FEET) =  1.35   TRAVEL TIME(MIN.) =   1.21
   Tc(MIN.) =  23.93
   SUBAREA AREA(ACRES) =   20.40      SUBAREA RUNOFF(CFS) =   20.23
   EFFECTIVE AREA(ACRES) =     47.03      AREA-AVERAGED Fm(INCH/HR) =   0.23
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.76
   TOTAL AREA(ACRES) =       47.0          PEAK FLOW RATE(CFS) =     46.32

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.46   FLOW VELOCITY(FEET/SEC.) = 7.22
   LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31509.00 =   3043.00 FEET.
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       47.0  TC(MIN.) =     23.93
  EFFECTIVE AREA(ACRES) =     47.03  AREA-AVERAGED Fm(INCH/HR)= 0.23
  AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.757
  PEAK FLOW RATE(CFS)    =       46.32
==========================================================================

==========================================================================
  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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             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                     Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


  ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 16 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 10-YR EV MARCH 2019 CCHIU                                             *
  *************************************************************************

   FILE NAME: X31610EV.DAT
   TIME/DATE OF STUDY: 10:56 03/25/2019
 ========================================================================
   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   60.0    30.0       0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0       0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0       0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0       0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0       0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31600.00 TO NODE  31601.00 IS CODE =  21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =    329.00
   ELEVATION DATA: UPSTREAM(FEET) =    672.00  DOWNSTREAM(FEET) =    582.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.296
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.248
   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
   "GRASS"                  -        0.52     0.30     1.000     0   9.30
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.92
   TOTAL AREA(ACRES) =       0.52   PEAK FLOW RATE(CFS) =       0.92

 *************************************************************************
   FLOW PROCESS FROM NODE  31601.00 TO NODE  31602.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    582.00  DOWNSTREAM(FEET) =    554.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  229.00   CHANNEL SLOPE = 0.1223
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.134
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap    SCS
         LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
   USER-DEFINED             -        1.33     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) =     2.02
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.21
   AVERAGE FLOW DEPTH(FEET) =    0.40   TRAVEL TIME(MIN.) =    0.91
   Tc(MIN.) =   10.20
   SUBAREA AREA(ACRES) =      1.33      SUBAREA RUNOFF(CFS) =     2.20
   EFFECTIVE AREA(ACRES) =      1.86      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         1.9          PEAK FLOW RATE(CFS) =      3.06

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.46   FLOW VELOCITY(FEET/SEC.) =   4.77
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31602.00 =    558.00 FEET.

 *************************************************************************
   FLOW PROCESS FROM NODE  31602.00 TO NODE  31603.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    554.00  DOWNSTREAM(FEET) =    545.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  149.00   CHANNEL SLOPE = 0.0604
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.066
   SUBAREA LOSS RATE DATA(AMC  II):
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```
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
 USER-DEFINED              -        2.68     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) =      5.20
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.15
 AVERAGE FLOW DEPTH(FEET) =  0.65    TRAVEL TIME(MIN.) =   0.60
 Tc(MIN.) =   10.80
 SUBAREA AREA(ACRES) =    2.68      SUBAREA RUNOFF(CFS) =    4.27
 EFFECTIVE AREA(ACRES) =     4.54     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       4.5        PEAK FLOW RATE(CFS) =       7.22

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.73   FLOW VELOCITY(FEET/SEC.) =  4.52
 LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31603.00 =    707.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  31603.00 TO NODE  31604.00 IS CODE =  51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    525.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   184.00   CHANNEL SLOPE = 0.1087
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  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              -        3.07     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) =      9.59
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.04
 AVERAGE FLOW DEPTH(FEET) =  0.73    TRAVEL TIME(MIN.) =   0.51
 Tc(MIN.) =   11.31
 SUBAREA AREA(ACRES) =    3.07      SUBAREA RUNOFF(CFS) =    4.74
 EFFECTIVE AREA(ACRES) =     7.61     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       7.6        PEAK FLOW RATE(CFS) =      11.74

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.78   FLOW VELOCITY(FEET/SEC.) =  6.38
 LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31604.00 =    891.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  31604.00 TO NODE  31605.00 IS CODE =  51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =    495.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   266.00   CHANNEL SLOPE = 0.1128
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
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 *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.952
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
 USER-DEFINED              -        4.69     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) =     15.23
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.87
 AVERAGE FLOW DEPTH(FEET) =  0.86    TRAVEL TIME(MIN.) =   0.64
 Tc(MIN.) =   11.95
 SUBAREA AREA(ACRES) =    4.69      SUBAREA RUNOFF(CFS) =    6.97
 EFFECTIVE AREA(ACRES) =    12.30     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      12.3        PEAK FLOW RATE(CFS) =      18.29

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.92   FLOW VELOCITY(FEET/SEC.) =  7.20
 LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31605.00 =   1157.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  31605.00 TO NODE  31606.00 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    495.00  DOWNSTREAM(FEET) =    470.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   444.00   CHANNEL SLOPE = 0.0563
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.846
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
 USER-DEFINED              -        8.98     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) =     24.54
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.95
 AVERAGE FLOW DEPTH(FEET) =  1.17    TRAVEL TIME(MIN.) =   1.24
 Tc(MIN.) =   13.20
 SUBAREA AREA(ACRES) =    8.98      SUBAREA RUNOFF(CFS) =   12.49
 EFFECTIVE AREA(ACRES) =    21.28     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      21.3        PEAK FLOW RATE(CFS) =      29.62

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.26   FLOW VELOCITY(FEET/SEC.) =  6.26
 LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31606.00 =   1601.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  31606.00 TO NODE  31607.00 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    439.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   763.00   CHANNEL SLOPE = 0.0406
```

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      CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
      *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.699
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/        SCS SOIL     AREA        Fp          Ap       SCS
          LAND USE             GROUP      (ACRES)   (INCH/HR)   (DECIMAL)   CN
      USER-DEFINED               -          20.37      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) =      42.45
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.04
      AVERAGE FLOW DEPTH(FEET) =  1.53   TRAVEL TIME(MIN.) =   2.11
      Tc(MIN.) =   15.30
      SUBAREA AREA(ACRES) =    20.37      SUBAREA RUNOFF(CFS) =   25.64
      EFFECTIVE AREA(ACRES) =      41.65      AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
      TOTAL AREA(ACRES) =       41.6          PEAK FLOW RATE(CFS) =       52.44

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) =  1.66   FLOW VELOCITY(FEET/SEC.) =   6.35
      LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31607.00 =    2364.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  31607.00 TO NODE  31608.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
      ELEVATION DATA: UPSTREAM(FEET) =     439.00  DOWNSTREAM(FEET) =     380.00
      CHANNEL LENGTH THRU SUBAREA(FEET) = 1396.00   CHANNEL SLOPE = 0.0423
      CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
      *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.518
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/        SCS SOIL     AREA        Fp          Ap       SCS
          LAND USE             GROUP      (ACRES)   (INCH/HR)   (DECIMAL)   CN
      USER-DEFINED               -          25.28      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) =      66.31
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.85
      AVERAGE FLOW DEPTH(FEET) =  1.80   TRAVEL TIME(MIN.) =   3.39
      Tc(MIN.) =   18.70
      SUBAREA AREA(ACRES) =    25.28      SUBAREA RUNOFF(CFS) =   27.71
      EFFECTIVE AREA(ACRES) =      66.93      AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
      TOTAL AREA(ACRES) =       66.9          PEAK FLOW RATE(CFS) =       73.37

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) =  1.86   FLOW VELOCITY(FEET/SEC.) =   7.04
      LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31608.00 =    3760.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  31608.00 TO NODE  31609.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
```

```
      ELEVATION DATA: UPSTREAM(FEET) =     380.00  DOWNSTREAM(FEET) =     350.00
      CHANNEL LENGTH THRU SUBAREA(FEET) =  715.00   CHANNEL SLOPE = 0.0420
      CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
      *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.448
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/        SCS SOIL     AREA        Fp          Ap       SCS
          LAND USE             GROUP      (ACRES)   (INCH/HR)   (DECIMAL)   CN
      USER-DEFINED               -          19.63      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) =      83.51
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.26
      AVERAGE FLOW DEPTH(FEET) =  1.96   TRAVEL TIME(MIN.) =   1.64
      Tc(MIN.) =   20.34
      SUBAREA AREA(ACRES) =    19.63      SUBAREA RUNOFF(CFS) =   20.28
      EFFECTIVE AREA(ACRES) =      86.56      AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
      TOTAL AREA(ACRES) =       86.6          PEAK FLOW RATE(CFS) =       89.43

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) =  2.01   FLOW VELOCITY(FEET/SEC.) =   7.37
      LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31609.00 =    4475.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  31609.00 TO NODE  31610.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
      ELEVATION DATA: UPSTREAM(FEET) =     350.00  DOWNSTREAM(FEET) =     325.00
      CHANNEL LENGTH THRU SUBAREA(FEET) =  948.00   CHANNEL SLOPE = 0.0264
      CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
      *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.357
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/        SCS SOIL     AREA        Fp          Ap       SCS
          LAND USE             GROUP      (ACRES)   (INCH/HR)   (DECIMAL)   CN
      USER-DEFINED               -          17.36      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) =      97.69
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.33
      AVERAGE FLOW DEPTH(FEET) =  2.27   TRAVEL TIME(MIN.) =   2.50
      Tc(MIN.) =   22.83
      SUBAREA AREA(ACRES) =    17.36      SUBAREA RUNOFF(CFS) =   16.51
      EFFECTIVE AREA(ACRES) =     103.92      AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
      TOTAL AREA(ACRES) =      103.9          PEAK FLOW RATE(CFS) =       98.83

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) =  2.28   FLOW VELOCITY(FEET/SEC.) =   6.35
      LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31610.00 =    5423.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  31610.00 TO NODE  31611.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     325.00  DOWNSTREAM(FEET) =     310.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1182.00   CHANNEL SLOPE = 0.0127
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.264
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        69.76     0.30      0.990     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.990
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    129.19
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.41
   AVERAGE FLOW DEPTH(FEET) =  2.59   TRAVEL TIME(MIN.) =   3.07
   Tc(MIN.) =  25.91
   SUBAREA AREA(ACRES) =    69.76        SUBAREA RUNOFF(CFS) =   60.70
   EFFECTIVE AREA(ACRES) =    173.68      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       173.7          PEAK FLOW RATE(CFS) =     150.84

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.75   FLOW VELOCITY(FEET/SEC.) =   6.65
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31611.00 =   6605.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE  31611.00 TO NODE  31612.00 IS CODE = 51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     310.00  DOWNSTREAM(FEET) =     308.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  164.00   CHANNEL SLOPE = 0.0122
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.253
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        17.90     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) =    158.52
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.64
   AVERAGE FLOW DEPTH(FEET) =  2.82   TRAVEL TIME(MIN.) =   0.41
   Tc(MIN.) =  26.32
   SUBAREA AREA(ACRES) =    17.90        SUBAREA RUNOFF(CFS) =   15.35
   EFFECTIVE AREA(ACRES) =    191.58      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       191.6          PEAK FLOW RATE(CFS) =     164.45

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.86   FLOW VELOCITY(FEET/SEC.) =   6.71
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31612.00 =   6769.00 FEET.
=========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =       191.6  TC(MIN.) =      26.32
```

```
   EFFECTIVE AREA(ACRES) =     191.58  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.996
   PEAK FLOW RATE(CFS)    =      164.45
=========================================================================
=========================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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

                          Michael Baker International
                         5 Hutton Centre Drive Suite 500
                             Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 17A EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 10-YR EV MARCH 2019 CCHIU                                             *
 **********************************************************************

   FILE NAME: X17A10EV.DAT
   TIME/DATE OF STUDY: 10:48 03/25/2019
===============================================================================
   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   60.0    30.0    0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  2   50.0    25.0    0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  3   40.0    20.0    0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  4   30.0    15.0    0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  5   20.0    10.0    0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31700.00 TO NODE  31701.00 IS CODE =  21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ===============================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
   ELEVATION DATA: UPSTREAM(FEET) =   545.00  DOWNSTREAM(FEET) =    515.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.410
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.003
   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
   "GRASS"                   -        0.43     0.30     1.000     0  11.41
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.65
   TOTAL AREA(ACRES) =        0.43    PEAK FLOW RATE(CFS) =        0.65

*******************************************************************************
   FLOW PROCESS FROM NODE  31701.00 TO NODE  31702.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   515.00  DOWNSTREAM(FEET) =   490.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.1147
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.924
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap    SCS
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        0.40     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) =      0.95
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.27
   AVERAGE FLOW DEPTH(FEET) =   0.27    TRAVEL TIME(MIN.) =   0.85
   Tc(MIN.) =   12.26
   SUBAREA AREA(ACRES) =      0.40       SUBAREA RUNOFF(CFS) =      0.59
   EFFECTIVE AREA(ACRES) =        0.83      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =           0.8        PEAK FLOW RATE(CFS) =       1.21

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =   4.47
   LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31702.00 =     539.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE  31702.00 TO NODE  31703.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   465.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  300.00   CHANNEL SLOPE = 0.0833
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.817
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
     USER-DEFINED              -        1.55      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) =       2.27
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.81
     AVERAGE FLOW DEPTH(FEET) = 0.45   TRAVEL TIME(MIN.) =   1.31
     Tc(MIN.) =  13.57
     SUBAREA AREA(ACRES) =     1.55      SUBAREA RUNOFF(CFS) =    2.12
     EFFECTIVE AREA(ACRES) =      2.38     AREA-AVERAGED Fm(INCH/HR) =  0.30
     AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =         2.4       PEAK FLOW RATE(CFS) =      3.25

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 0.51   FLOW VELOCITY(FEET/SEC.) =  4.19
     LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31703.00 =   839.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31703.00 TO NODE  31704.00 IS CODE = 51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =    462.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =     83.00   CHANNEL SLOPE = 0.0361
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.787
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED              -        2.59      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) =       4.98
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.40
    AVERAGE FLOW DEPTH(FEET) = 0.70   TRAVEL TIME(MIN.) =   0.41
    Tc(MIN.) =  13.98
    SUBAREA AREA(ACRES) =     2.59      SUBAREA RUNOFF(CFS) =    3.47
    EFFECTIVE AREA(ACRES) =      4.97     AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =         5.0       PEAK FLOW RATE(CFS) =      6.65

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.78   FLOW VELOCITY(FEET/SEC.) =  3.64
    LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31704.00 =   922.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31704.00 TO NODE  31705.00 IS CODE = 51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    462.00  DOWNSTREAM(FEET) =    460.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =     60.00   CHANNEL SLOPE = 0.0333
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
*   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.769
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED              -        5.22      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) =      10.11
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.93
    AVERAGE FLOW DEPTH(FEET) = 0.93   TRAVEL TIME(MIN.) =   0.25
    Tc(MIN.) =  14.23
    SUBAREA AREA(ACRES) =     5.22      SUBAREA RUNOFF(CFS) =    6.90
    EFFECTIVE AREA(ACRES) =     10.19     AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        10.2       PEAK FLOW RATE(CFS) =     13.48

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 1.03   FLOW VELOCITY(FEET/SEC.) =  4.21
    LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31705.00 =   982.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31705.00 TO NODE  31706.00 IS CODE = 51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    375.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    604.00   CHANNEL SLOPE = 0.1407
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.685
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED              -        8.10      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) =      18.53
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.83
    AVERAGE FLOW DEPTH(FEET) = 0.89   TRAVEL TIME(MIN.) =   1.28
    Tc(MIN.) =  15.52
    SUBAREA AREA(ACRES) =     8.10      SUBAREA RUNOFF(CFS) =   10.10
    EFFECTIVE AREA(ACRES) =     18.29     AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        18.3       PEAK FLOW RATE(CFS) =     22.81

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.96   FLOW VELOCITY(FEET/SEC.) =  8.28
    LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31706.00 =  1586.00 FEET.
=============================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)       =       18.3  TC(MIN.) =     15.52
   EFFECTIVE AREA(ACRES) =       18.29  AREA-AVERAGED Fm(INCH/HR)= 0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)     =      22.81
=============================================================================
=============================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
_____
************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
            (c) Copyright 1983-2013 Advanced Engineering Software (aes)
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                       Analysis prepared by:

                    Michael Baker International
                  5 Hutton Centre Drive Suite 500
                      Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 17B EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 10-YR EV MARCH 2019 CCHIU                                            *
 ***********************************************************************

  FILE NAME: X17B10EV.DAT
  TIME/DATE OF STUDY: 10:48 03/25/2019
========================================================================
   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   60.0    30.0     0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  2   50.0    25.0     0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  3   40.0    20.0     0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  4   30.0    15.0     0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  5   20.0    10.0     0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31710.00 TO NODE  31711.00 IS CODE = 21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
  ELEVATION DATA: UPSTREAM(FEET) =    631.00  DOWNSTREAM(FEET) =    605.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.719
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.974
  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
  "CHAPARRAL,BROADLEAF"      -        0.32     0.30     1.000     0   11.72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.49
  TOTAL AREA(ACRES) =        0.32    PEAK FLOW RATE(CFS) =       0.49

************************************************************************
  FLOW PROCESS FROM NODE  31711.00 TO NODE  31712.00 IS CODE = 51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    588.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    71.00   CHANNEL SLOPE = 0.2394
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.949
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap     SCS
        LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        0.56     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) =       0.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.56
  AVERAGE FLOW DEPTH(FEET) =   0.26   TRAVEL TIME(MIN.) =   0.26
  Tc(MIN.) =   11.98
  SUBAREA AREA(ACRES) =      0.56        SUBAREA RUNOFF(CFS) =      0.83
  EFFECTIVE AREA(ACRES) =       0.88      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) =       1.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.30    FLOW VELOCITY(FEET/SEC.) =   4.84
  LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31712.00 =     391.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE  31712.00 TO NODE  31713.00 IS CODE = 51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    588.00  DOWNSTREAM(FEET) =    565.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   181.00   CHANNEL SLOPE = 0.1271
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.884
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
      DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp         Ap      SCS
         LAND USE             GROUP      (ACRES)   (INCH/HR)  (DECIMAL)  CN
      USER-DEFINED              -         0.31       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) =       1.53
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.04
      AVERAGE FLOW DEPTH(FEET) =  0.36    TRAVEL TIME(MIN.) =  0.75
      Tc(MIN.) =  12.73
      SUBAREA AREA(ACRES) =     0.31      SUBAREA RUNOFF(CFS) =    0.45
      EFFECTIVE AREA(ACRES) =      1.20    AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
      TOTAL AREA(ACRES) =         1.2         PEAK FLOW RATE(CFS) =       1.71

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) = 0.37   FLOW VELOCITY(FEET/SEC.) =  4.13
      LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31713.00 =    572.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31713.00 TO NODE  31714.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =    545.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   185.00   CHANNEL SLOPE = 0.1081
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -         1.36       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) =       2.64
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.40
      AVERAGE FLOW DEPTH(FEET) =  0.45    TRAVEL TIME(MIN.) =  0.70
      Tc(MIN.) =  13.43
      SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =    1.87
      EFFECTIVE AREA(ACRES) =      2.56    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) =       3.51

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) = 0.50   FLOW VELOCITY(FEET/SEC.) =  4.67
      LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31714.00 =    757.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31714.00 TO NODE  31715.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    531.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   128.00   CHANNEL SLOPE = 0.1094
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.798
      SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp         Ap      SCS
         LAND USE             GROUP      (ACRES)   (INCH/HR)  (DECIMAL)  CN
      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
      TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.40
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.27
      AVERAGE FLOW DEPTH(FEET) =  0.58    TRAVEL TIME(MIN.) =  0.41
      Tc(MIN.) =  13.83
      SUBAREA AREA(ACRES) =     2.80      SUBAREA RUNOFF(CFS) =    3.77
      EFFECTIVE AREA(ACRES) =      5.35    AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
      TOTAL AREA(ACRES) =         5.4         PEAK FLOW RATE(CFS) =       7.22

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) = 0.65   FLOW VELOCITY(FEET/SEC.) =  5.64
      LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31715.00 =    885.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31715.00 TO NODE  31716.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM(FEET) =    507.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE = 0.0889
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.744
      SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp         Ap      SCS
         LAND USE             GROUP      (ACRES)   (INCH/HR)  (DECIMAL)  CN
      USER-DEFINED              -         5.95       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) =      11.08
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.80
      AVERAGE FLOW DEPTH(FEET) =  0.80    TRAVEL TIME(MIN.) =  0.78
      Tc(MIN.) =  14.61
      SUBAREA AREA(ACRES) =     5.95      SUBAREA RUNOFF(CFS) =    7.73
      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) =      14.68

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) = 0.89   FLOW VELOCITY(FEET/SEC.) =  6.21
      LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31716.00 =   1155.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31716.00 TO NODE  31717.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    507.00  DOWNSTREAM(FEET) =    400.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1020.00   CHANNEL SLOPE = 0.1049
```

```
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
*    5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.606
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
      LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
USER-DEFINED             -         13.90      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) =      22.86
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.36
AVERAGE FLOW DEPTH(FEET) =   1.02   TRAVEL TIME(MIN.) =   2.31
Tc(MIN.) =   16.92
SUBAREA AREA(ACRES) =    13.90       SUBAREA RUNOFF(CFS) =   16.33
EFFECTIVE AREA(ACRES) =     25.20      AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       25.2        PEAK FLOW RATE(CFS) =       29.61

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.12   FLOW VELOCITY(FEET/SEC.) =   7.89
LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31717.00 =    2175.00 FEET.
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =        25.2  TC(MIN.) =      16.92
EFFECTIVE AREA(ACRES) =      25.20  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)   =       29.61
================================================================================
================================================================================
END OF RATIONAL METHOD ANALYSIS
```

```
_____
********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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              Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                    Michael Baker International
                    5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 18 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 10-YR EV MARCH 2019 CCHIU                                          *
 *********************************************************************

   FILE NAME: X31810EV.DAT
   TIME/DATE OF STUDY: 10:56 03/25/2019
==========================================================================
   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   60.0   30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   50.0   25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3   40.0   20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4   30.0   15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5   20.0   10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31800.00 TO NODE  31801.00 IS CODE =  21
-----------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =    329.00
   ELEVATION DATA: UPSTREAM(FEET) =    729.00  DOWNSTREAM(FEET) =    630.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.120
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.272
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS    Tc
       LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)  CN  (MIN.)
   NATURAL FAIR COVER
   "CHAPARRAL,BROADLEAF"      -        0.10    0.30     1.000     0   9.12
   NATURAL FAIR COVER
   "CHAPARRAL,NARROWLEAF"     -        0.10    0.30     1.000     0   9.12
   NATURAL FAIR COVER
   "OPEN BRUSH"               -        1.30    0.30     1.000     0   9.12
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      2.66
   TOTAL AREA(ACRES) =       1.50    PEAK FLOW RATE(CFS) =       2.66


*********************************************************************
   FLOW PROCESS FROM NODE  31801.00 TO NODE  31802.00 IS CODE =  51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    597.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  196.00   CHANNEL SLOPE = 0.1684
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       2.66
   FLOW VELOCITY(FEET/SEC.) =   5.16   FLOW DEPTH(FEET) =   0.41
   TRAVEL TIME(MIN.) =   0.63   Tc(MIN.) =    9.75
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31802.00 =    525.00 FEET.

*********************************************************************
   FLOW PROCESS FROM NODE  31802.00 TO NODE  31802.00 IS CODE =  81
-----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   MAINLINE Tc(MIN.) =    9.75
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.188
   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               -        1.80    0.30     1.000     -
   USER-DEFINED               -        0.10    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) =    2.00       SUBAREA RUNOFF(CFS) =    3.40
   EFFECTIVE AREA(ACRES) =     3.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =       3.5       PEAK FLOW RATE(CFS) =      5.95

*********************************************************************
   FLOW PROCESS FROM NODE  31802.00 TO NODE  31803.00 IS CODE =  51
-----------------------------------------------------------------------
```

```
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    597.00  DOWNSTREAM(FEET) =    565.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   225.00   CHANNEL SLOPE = 0.1422
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       5.95
   FLOW VELOCITY(FEET/SEC.) =  5.96   FLOW DEPTH(FEET) =   0.58
   TRAVEL TIME(MIN.) =   0.63   Tc(MIN.) =   10.38
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31803.00 =    750.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31803.00 TO NODE  31803.00 IS CODE =  81
--------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   MAINLINE Tc(MIN.) =   10.38
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.113
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        2.10     0.30     1.000     -
   USER-DEFINED               -        0.20     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) =    2.30      SUBAREA RUNOFF(CFS) =     3.75
   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) =        9.46

****************************************************************************
   FLOW PROCESS FROM NODE  31803.00 TO NODE  31804.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =    530.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   228.00   CHANNEL SLOPE = 0.1535
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       9.46
   FLOW VELOCITY(FEET/SEC.) =  6.78   FLOW DEPTH(FEET) =   0.68
   TRAVEL TIME(MIN.) =   0.56   Tc(MIN.) =   10.94
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31804.00 =    978.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31804.00 TO NODE  31804.00 IS CODE =  81
--------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   MAINLINE Tc(MIN.) =   10.94
   *   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               -        4.10     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) =    4.70      SUBAREA RUNOFF(CFS) =     7.41
   EFFECTIVE AREA(ACRES) =     10.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        10.5       PEAK FLOW RATE(CFS) =       16.55

****************************************************************************
   FLOW PROCESS FROM NODE  31804.00 TO NODE  31805.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    530.00  DOWNSTREAM(FEET) =    498.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   414.00   CHANNEL SLOPE = 0.0773
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      16.55
   FLOW VELOCITY(FEET/SEC.) =  6.10   FLOW DEPTH(FEET) =   0.95
   TRAVEL TIME(MIN.) =   1.13   Tc(MIN.) =   12.07
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31805.00 =   1392.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31805.00 TO NODE  31805.00 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               -        0.20     0.30     1.000     -
   USER-DEFINED               -        5.70     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) =    6.70      SUBAREA RUNOFF(CFS) =     9.89
   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) =       25.40

****************************************************************************
   FLOW PROCESS FROM NODE  31805.00 TO NODE  31806.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    498.00  DOWNSTREAM(FEET) =    454.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE = 0.0649
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      25.40
   FLOW VELOCITY(FEET/SEC.) =  6.35   FLOW DEPTH(FEET) =   1.15
   TRAVEL TIME(MIN.) =   1.78   Tc(MIN.) =   13.85
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31806.00 =   2070.00 FEET.

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

```
   FLOW PROCESS FROM NODE  31806.00 TO NODE  31806.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =   13.85
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.796
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE             GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -         2.10     0.30     1.000     -
   USER-DEFINED               -         0.40     0.30     1.000     -
   USER-DEFINED               -         7.90     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) =    10.40      SUBAREA RUNOFF(CFS) =   14.01
   EFFECTIVE AREA(ACRES) =     27.60    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       27.6       PEAK FLOW RATE(CFS) =      37.17

*******************************************************************************
   FLOW PROCESS FROM NODE  31806.00 TO NODE  31819.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    454.00  DOWNSTREAM(FEET) =    410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   737.00   CHANNEL SLOPE =  0.0597
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       37.17
   FLOW VELOCITY(FEET/SEC.) =   6.77   FLOW DEPTH(FEET) =   1.35
   TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =    15.67
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31819.00 =    2807.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =   15.67
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.676
   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               -         0.30     0.30     1.000     -
   USER-DEFINED               -         5.60     0.30     1.000     -
   USER-DEFINED               -         0.50     0.30     1.000     -
   USER-DEFINED               -         0.30     0.30     1.000     -
   USER-DEFINED               -         6.30     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) =    13.70      SUBAREA RUNOFF(CFS) =   16.97
   EFFECTIVE AREA(ACRES) =     41.30    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       41.3       PEAK FLOW RATE(CFS) =      51.16

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

```
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =   15.67
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.676
   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     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA AREA(ACRES) =    0.20       SUBAREA RUNOFF(CFS) =    0.25
   EFFECTIVE AREA(ACRES) =     41.50    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       41.5       PEAK FLOW RATE(CFS) =      51.41

*******************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 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.) =   15.67
   RAINFALL INTENSITY(INCH/HR) =   1.68
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =     41.50
   TOTAL STREAM AREA(ACRES) =      41.50
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      51.41

*******************************************************************************
   FLOW PROCESS FROM NODE  31810.00 TO NODE  31811.00 IS CODE =  21
-------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   395.00
   ELEVATION DATA: UPSTREAM(FEET) =    697.00  DOWNSTREAM(FEET) =    645.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.576
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.987
   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"               -         0.40     0.30     1.000     0   11.58
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =     0.61
   TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.61

*******************************************************************************
   FLOW PROCESS FROM NODE  31811.00 TO NODE  31812.00 IS CODE = 51
-------------------------------------------------------------------------------
```

```
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    610.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  148.00   CHANNEL SLOPE = 0.2365
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
    CHANNEL FLOW THRU SUBAREA(CFS) =       0.61
    FLOW VELOCITY(FEET/SEC.) =  4.03   FLOW DEPTH(FEET) =   0.22
    TRAVEL TIME(MIN.) =   0.61   Tc(MIN.) =   12.19
    LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31812.00 =    543.00 FEET.
********************************************************************************
    FLOW PROCESS FROM NODE  31812.00 TO NODE  31812.00 IS CODE = 81
--------------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    MAINLINE Tc(MIN.) =   12.19
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.931
    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     -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
    SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.44
    EFFECTIVE AREA(ACRES) =      0.70   AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =         0.7       PEAK FLOW RATE(CFS) =       1.03
********************************************************************************
    FLOW PROCESS FROM NODE  31812.00 TO NODE  31813.00 IS CODE = 51
--------------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   610.00  DOWNSTREAM(FEET) =    591.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  176.00   CHANNEL SLOPE = 0.1080
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
    CHANNEL FLOW THRU SUBAREA(CFS) =       1.03
    FLOW VELOCITY(FEET/SEC.) =  3.44   FLOW DEPTH(FEET) =   0.32
    TRAVEL TIME(MIN.) =   0.85   Tc(MIN.) =   13.04
    LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31813.00 =    719.00 FEET.
********************************************************************************
    FLOW PROCESS FROM NODE  31813.00 TO NODE  31813.00 IS CODE = 81
--------------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    MAINLINE Tc(MIN.) =   13.04
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.858
    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     -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
    SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    1.54
    EFFECTIVE AREA(ACRES) =      1.80   AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =         1.8       PEAK FLOW RATE(CFS) =       2.52
********************************************************************************
    FLOW PROCESS FROM NODE  31813.00 TO NODE  31814.00 IS CODE = 51
--------------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   591.00  DOWNSTREAM(FEET) =    576.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  184.00   CHANNEL SLOPE = 0.0815
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
    CHANNEL FLOW THRU SUBAREA(CFS) =       2.52
    FLOW VELOCITY(FEET/SEC.) =  3.84   FLOW DEPTH(FEET) =   0.47
    TRAVEL TIME(MIN.) =   0.80   Tc(MIN.) =   13.84
    LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31814.00 =    903.00 FEET.
********************************************************************************
    FLOW PROCESS FROM NODE  31814.00 TO NODE  31814.00 IS CODE = 81
--------------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    MAINLINE Tc(MIN.) =   13.84
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.797
    SUBAREA LOSS RATE DATA(AMC II):
     DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -        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) =    3.50      SUBAREA RUNOFF(CFS) =    4.72
    EFFECTIVE AREA(ACRES) =      5.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =         5.3       PEAK FLOW RATE(CFS) =       7.14
********************************************************************************
    FLOW PROCESS FROM NODE  31814.00 TO NODE  31815.00 IS CODE = 51
--------------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   576.00  DOWNSTREAM(FEET) =    566.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  120.00   CHANNEL SLOPE = 0.0833
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
    CHANNEL FLOW THRU SUBAREA(CFS) =       7.14
    FLOW VELOCITY(FEET/SEC.) =  5.09   FLOW DEPTH(FEET) =   0.68
    TRAVEL TIME(MIN.) =   0.39   Tc(MIN.) =   14.23
    LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31815.00 =   1023.00 FEET.
********************************************************************************
    FLOW PROCESS FROM NODE  31815.00 TO NODE  31815.00 IS CODE = 81
--------------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
```

```
    MAINLINE Tc(MIN.) =   14.23
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.769
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL     AREA       Fp       Ap      SCS
        LAND USE             GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
     USER-DEFINED              -          3.10      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) =    3.10     SUBAREA RUNOFF(CFS) =    4.10
    EFFECTIVE AREA(ACRES) =      8.40   AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =         8.4      PEAK FLOW RATE(CFS) =      11.11

***********************************************************************
    FLOW PROCESS FROM NODE  31815.00 TO NODE  31816.00 IS CODE = 51
---------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    566.00  DOWNSTREAM(FEET) =     544.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.1009
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
    CHANNEL FLOW THRU SUBAREA(CFS) =      11.11
    FLOW VELOCITY(FEET/SEC.) =   6.07   FLOW DEPTH(FEET) =   0.78
    TRAVEL TIME(MIN.) =   0.60   Tc(MIN.) =   14.83
    LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31816.00 =   1241.00 FEET.

***********************************************************************
    FLOW PROCESS FROM NODE  31816.00 TO NODE  31816.00 IS CODE = 81
---------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====================================================================
    MAINLINE Tc(MIN.) =   14.83
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.729
    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              -          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) =    5.80     SUBAREA RUNOFF(CFS) =    7.46
    EFFECTIVE AREA(ACRES) =     14.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        14.2      PEAK FLOW RATE(CFS) =      18.26

***********************************************************************
    FLOW PROCESS FROM NODE  31816.00 TO NODE  31817.00 IS CODE = 51
---------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    544.00  DOWNSTREAM(FEET) =     488.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  668.00   CHANNEL SLOPE = 0.0838
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
    CHANNEL FLOW THRU SUBAREA(CFS) =      18.26
```

```
    FLOW VELOCITY(FEET/SEC.) =   6.42   FLOW DEPTH(FEET) =   0.97
    TRAVEL TIME(MIN.) =   1.73   Tc(MIN.) =   16.57
    LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31817.00 =   1909.00 FEET.

***********************************************************************
    FLOW PROCESS FROM NODE  31817.00 TO NODE  31817.00 IS CODE = 81
---------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====================================================================
    MAINLINE Tc(MIN.) =   16.57
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.625
    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              -         12.40      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) =   12.50     SUBAREA RUNOFF(CFS) =   14.90
    EFFECTIVE AREA(ACRES) =     26.70   AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        26.7      PEAK FLOW RATE(CFS) =      31.83

***********************************************************************
    FLOW PROCESS FROM NODE  31817.00 TO NODE  31818.00 IS CODE = 51
---------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    488.00  DOWNSTREAM(FEET) =     442.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  580.00   CHANNEL SLOPE = 0.0793
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
    CHANNEL FLOW THRU SUBAREA(CFS) =      31.83
    FLOW VELOCITY(FEET/SEC.) =   7.25   FLOW DEPTH(FEET) =   1.21
    TRAVEL TIME(MIN.) =   1.33   Tc(MIN.) =   17.90
    LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31818.00 =   2489.00 FEET.

***********************************************************************
    FLOW PROCESS FROM NODE  31818.00 TO NODE  31818.00 IS CODE = 81
---------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=====================================================================
    MAINLINE Tc(MIN.) =   17.90
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.556
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL     AREA       Fp       Ap      SCS
        LAND USE             GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
     USER-DEFINED              -          2.60      0.30     1.000     -
     USER-DEFINED              -         14.90      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) =   17.50     SUBAREA RUNOFF(CFS) =   19.78
    EFFECTIVE AREA(ACRES) =     44.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        44.2      PEAK FLOW RATE(CFS) =      49.95

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

```
     FLOW PROCESS FROM NODE  31818.00 TO NODE  31819.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    442.00  DOWNSTREAM(FEET) =    410.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   646.00   CHANNEL SLOPE =  0.0495
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     49.95
  FLOW VELOCITY(FEET/SEC.) =  6.78   FLOW DEPTH(FEET) =  1.57
  TRAVEL TIME(MIN.) =  1.59   Tc(MIN.) =  19.49
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31819.00 =   3135.00 FEET.
******************************************************************************
  FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =  19.49
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.483
  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             -         0.80     0.30     1.000     -
  USER-DEFINED             -         7.10     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) =    8.20      SUBAREA RUNOFF(CFS) =    8.73
  EFFECTIVE AREA(ACRES) =     52.40    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =     52.4       PEAK FLOW RATE(CFS) =     55.79
******************************************************************************
  FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 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.) =  19.49
  RAINFALL INTENSITY(INCH/HR) =   1.48
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      52.40
  TOTAL STREAM AREA(ACRES) =       52.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       55.79

  ** CONFLUENCE DATA **
   STREAM     Q      Tc    Intensity  Fp(Fm)    Ap     Ae    HEADWATER
   NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
     1      51.41   15.67   1.676   0.30( 0.30) 1.00    41.5   31800.00
     2      55.79   19.49   1.483   0.30( 0.30) 1.00    52.4   31810.00

  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     103.60   15.67   1.676   0.30( 0.30) 1.00    83.6   31800.00
     2      99.98   19.49   1.483   0.30( 0.30) 1.00    93.9   31810.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      103.60    Tc(MIN.) =     15.67
  EFFECTIVE AREA(ACRES) =      83.63   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      93.9
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31819.00 =   3135.00 FEET.
******************************************************************************
  FLOW PROCESS FROM NODE  31819.00 TO NODE  31820.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    363.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1134.00   CHANNEL SLOPE =  0.0414
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =    103.60
  FLOW VELOCITY(FEET/SEC.) =  7.60   FLOW DEPTH(FEET) =  2.13
  TRAVEL TIME(MIN.) =  2.49   Tc(MIN.) =  18.16
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31820.00 =   4269.00 FEET.
******************************************************************************
  FLOW PROCESS FROM NODE  31820.00 TO NODE  31820.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =  18.16
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.543
  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             -         2.30     0.30     1.000     -
  USER-DEFINED             -         1.70     0.30     1.000     -
  USER-DEFINED             -         3.30     0.30     1.000     -
  USER-DEFINED             -         2.50     0.30     1.000     -
  USER-DEFINED             -         8.50     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) =   18.70      SUBAREA RUNOFF(CFS) =   20.92
  EFFECTIVE AREA(ACRES) =     102.33   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      112.6       PEAK FLOW RATE(CFS) =    114.50
******************************************************************************
  FLOW PROCESS FROM NODE  31820.00 TO NODE  31820.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
```

```
   MAINLINE Tc(MIN.) =   18.16
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.543
   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             -       0.80      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) =   1.50     SUBAREA RUNOFF(CFS) =    1.68
   EFFECTIVE AREA(ACRES) =   103.83   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =     114.1      PEAK FLOW RATE(CFS) =     116.18

****************************************************************************
   FLOW PROCESS FROM NODE  31820.00 TO NODE  31821.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   363.00  DOWNSTREAM(FEET) =    325.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  614.00   CHANNEL SLOPE = 0.0619
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) =  3.00
   CHANNEL FLOW THRU SUBAREA(CFS) =    116.18
   FLOW VELOCITY(FEET/SEC.) =  9.10   FLOW DEPTH(FEET) =  2.06
   TRAVEL TIME(MIN.) =  1.12   Tc(MIN.) =   19.28
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31821.00 =   4883.00 FEET.


****************************************************************************
   FLOW PROCESS FROM NODE  31821.00 TO NODE  31821.00 IS CODE = 81
--------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   MAINLINE Tc(MIN.) =   19.28
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.492
   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             -       1.40      0.30     1.000      -
   USER-DEFINED             -       0.90      0.30     1.000      -
   USER-DEFINED             -       1.00      0.30     1.000      -
   USER-DEFINED             -       0.50      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) =   4.50     SUBAREA RUNOFF(CFS) =    4.83
   EFFECTIVE AREA(ACRES) =   108.33   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =     118.6      PEAK FLOW RATE(CFS) =     116.22

****************************************************************************
   FLOW PROCESS FROM NODE  31821.00 TO NODE  31821.00 IS CODE = 81
--------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
```

```
   MAINLINE Tc(MIN.) =   19.28
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.492
   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      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA AREA(ACRES) =   0.20     SUBAREA RUNOFF(CFS) =    0.21
   EFFECTIVE AREA(ACRES) =   108.53   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =     118.8      PEAK FLOW RATE(CFS) =     116.43
==========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =       118.8  TC(MIN.) =     19.28
   EFFECTIVE AREA(ACRES) =     108.53  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)   =     116.43

   ** PEAK FLOW RATE TABLE **
    STREAM      Q     Tc   Intensity  Fp(Fm)     Ap     Ae    HEADWATER
    NUMBER    (CFS) (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
       1     116.43  19.28   1.492   0.30( 0.30) 1.00   108.5  31800.00
       2     111.94  23.13   1.347   0.30( 0.30) 1.00   118.8  31810.00
==========================================================================
==========================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
_____
****************************************************************************
        RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2013 Advanced Engineering Software (aes)
           Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                     Michael Baker International
                   5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY ***************************
 * RMV PA-4 WATERSHED 2 EXISTING CONDITION                                 *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                   *
 * 10-YR EV MARCH 2019 CCHIU                                               *
 *************************************************************************

   FILE NAME: X40210EV.DAT
   TIME/DATE OF STUDY: 10:56 03/25/2019
===============================================================================
  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   60.0     30.0    0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  2   50.0     25.0    0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  3   40.0     20.0    0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  4   30.0     15.0    0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  5   20.0     10.0    0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth =  0.00 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  40200.00 TO NODE  40201.00 IS CODE =  21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   319.00
  ELEVATION DATA: UPSTREAM(FEET) =   647.00  DOWNSTREAM(FEET) =   555.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.085
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.277
  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
  "CHAPARRAL,BROADLEAF"       -       0.30    0.30     1.000    0    9.08
  NATURAL FAIR COVER
  "OPEN BRUSH"                -       0.20    0.30     1.000    0    9.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      0.89
  TOTAL AREA(ACRES) =       0.50   PEAK FLOW RATE(CFS) =       0.89

***************************************************************************
  FLOW PROCESS FROM NODE  40201.00 TO NODE  40202.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   555.00  DOWNSTREAM(FEET) =   525.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  150.00   CHANNEL SLOPE = 0.2000
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.89
  FLOW VELOCITY(FEET/SEC.) =  4.25    FLOW DEPTH(FEET) =   0.26
  TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =    9.67
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40202.00 =    469.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40202.00 TO NODE  40202.00 IS CODE =  81
-------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =    9.67
  *  5 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
  USER-DEFINED                -       0.30    0.30     1.000    -
  USER-DEFINED                -       0.10    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) =   0.70      SUBAREA RUNOFF(CFS) =    1.20
  EFFECTIVE AREA(ACRES) =     1.20   AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =      1.2       PEAK FLOW RATE(CFS) =      2.05

***************************************************************************
  FLOW PROCESS FROM NODE  40202.00 TO NODE  40203.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =    505.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE = 0.1143
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.05
  FLOW VELOCITY(FEET/SEC.) =   4.12   FLOW DEPTH(FEET) =   0.41
  TRAVEL TIME(MIN.) =   0.71   Tc(MIN.) =   10.38
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40203.00 =    644.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40203.00 TO NODE  40203.00 IS CODE =  81
-----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
  MAINLINE Tc(MIN.) =   10.38
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.113
  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              -         0.10     0.30      1.000      -
  USER-DEFINED              -         0.40     0.30      1.000      -
  USER-DEFINED              -         0.10     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) =    0.70      SUBAREA RUNOFF(CFS) =    1.14
  EFFECTIVE AREA(ACRES) =       1.90   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.9       PEAK FLOW RATE(CFS) =        3.10

*****************************************************************************
  FLOW PROCESS FROM NODE  40203.00 TO NODE  40204.00 IS CODE =  51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    505.00  DOWNSTREAM(FEET) =    493.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.0550
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.10
  FLOW VELOCITY(FEET/SEC.) =   3.56   FLOW DEPTH(FEET) =   0.54
  TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =   11.40
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40204.00 =    862.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40204.00 TO NODE  40204.00 IS CODE =  81
-----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
  MAINLINE Tc(MIN.) =   11.40
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.004
  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              -         0.10     0.30      1.000      -
```

```
  USER-DEFINED              -         0.30     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) =    1.40      SUBAREA RUNOFF(CFS) =    2.15
  EFFECTIVE AREA(ACRES) =       3.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =        5.06

*****************************************************************************
  FLOW PROCESS FROM NODE  40204.00 TO NODE  40205.00 IS CODE =  51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    493.00  DOWNSTREAM(FEET) =    472.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.0963
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.06
  FLOW VELOCITY(FEET/SEC.) =   4.94   FLOW DEPTH(FEET) =   0.58
  TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =   12.14
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40205.00 =    1080.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40205.00 TO NODE  40205.00 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              -         0.20     0.30      1.000      -
  USER-DEFINED              -         0.10     0.30      1.000      -
  USER-DEFINED              -         0.30     0.30      1.000      -
  USER-DEFINED              -         1.30     0.30      1.000      -
  USER-DEFINED              -         0.20     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) =    3.09
  EFFECTIVE AREA(ACRES) =       5.40   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =        7.95

*****************************************************************************
  FLOW PROCESS FROM NODE  40205.00 TO NODE  40206.00 IS CODE =  51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    472.00  DOWNSTREAM(FEET) =    455.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   71.00   CHANNEL SLOPE = 0.2394
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.95
  FLOW VELOCITY(FEET/SEC.) =   7.75   FLOW DEPTH(FEET) =   0.58
```

```
     TRAVEL TIME(MIN.) =   0.15   Tc(MIN.) =   12.29
     LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40206.00 =   1151.00 FEET.

**********************************************************************
   FLOW PROCESS FROM NODE  40206.00 TO NODE  40206.00 IS CODE = 81
----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   MAINLINE Tc(MIN.) =   12.29
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.921
   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              -        0.30      0.30      1.000      -
   USER-DEFINED              -        0.20      0.30      1.000      -
   USER-DEFINED              -        1.10      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) =   3.80      SUBAREA RUNOFF(CFS) =   5.55
   EFFECTIVE AREA(ACRES) =     9.20    AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =       9.2      PEAK FLOW RATE(CFS) =     13.43

**********************************************************************
   FLOW PROCESS FROM NODE  40206.00 TO NODE  40207.00 IS CODE = 51
----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   455.00  DOWNSTREAM(FEET) =   400.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE = 0.1389
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =     13.43
   FLOW VELOCITY(FEET/SEC.) =   7.20    FLOW DEPTH(FEET) =   0.79
   TRAVEL TIME(MIN.) =   0.92   Tc(MIN.) =   13.21
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40207.00 =   1547.00 FEET.

**********************************************************************
   FLOW PROCESS FROM NODE  40207.00 TO NODE  40207.00 IS CODE = 81
----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   MAINLINE Tc(MIN.) =   13.21
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.845
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA      Fp        Ap      SCS
        LAND USE          GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        0.40      0.30      1.000      -
   USER-DEFINED              -        0.20      0.30      1.000      -
   USER-DEFINED              -        1.10      0.30      1.000      -
   USER-DEFINED              -        0.90      0.30      1.000      -
   USER-DEFINED              -        2.90      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) =    6.30     SUBAREA RUNOFF(CFS) =   8.76
   EFFECTIVE AREA(ACRES) =    15.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =      15.5      PEAK FLOW RATE(CFS) =     21.56

**********************************************************************
   FLOW PROCESS FROM NODE  40207.00 TO NODE  40208.00 IS CODE = 51
----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   400.00  DOWNSTREAM(FEET) =   384.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   452.00   CHANNEL SLOPE = 0.0354
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =     21.56
   FLOW VELOCITY(FEET/SEC.) =   6.01    FLOW DEPTH(FEET) =   1.09
   TRAVEL TIME(MIN.) =   1.25   Tc(MIN.) =   14.46
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40208.00 =   1999.00 FEET.

**********************************************************************
   FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE = 81
----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   MAINLINE Tc(MIN.) =   14.46
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.754
   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              -        0.90      0.30      1.000      -
   USER-DEFINED              -        1.70      0.30      1.000      -
   USER-DEFINED              -        0.10      0.30      1.000      -
   USER-DEFINED              -        0.20      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) =    3.00     SUBAREA RUNOFF(CFS) =   3.92
   EFFECTIVE AREA(ACRES) =    18.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =      18.5      PEAK FLOW RATE(CFS) =     24.20

**********************************************************************
   FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE = 81
----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   MAINLINE Tc(MIN.) =   14.46
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.754
   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              -        1.30      0.30      1.000      -
   USER-DEFINED              -        1.60      0.30      1.000      -
   USER-DEFINED              -        0.90      0.30      1.000      -
   USER-DEFINED              -        2.10      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) =    7.20    SUBAREA RUNOFF(CFS) =    9.42
  EFFECTIVE AREA(ACRES) =   25.70   AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       25.7      PEAK FLOW RATE(CFS) =     33.62
****************************************************************************
  FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.46
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.754
  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               -         0.20      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) =    2.80    SUBAREA RUNOFF(CFS) =    3.66
  EFFECTIVE AREA(ACRES) =   28.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       28.5      PEAK FLOW RATE(CFS) =     37.29

****************************************************************************
  FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.46
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.754
  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      0.100     -
  USER-DEFINED               -         0.10      0.30      0.500     -
  USER-DEFINED               -         1.60      0.30      1.000     -
  USER-DEFINED               -         1.20      0.30      1.000     -
  USER-DEFINED               -         0.20      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 = 0.852
  SUBAREA AREA(ACRES) =    4.60    SUBAREA RUNOFF(CFS) =    6.20
  EFFECTIVE AREA(ACRES) =   33.10   AREA-AVERAGED Fm(INCH/HR) = 0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =       33.1      PEAK FLOW RATE(CFS) =     43.49

****************************************************************************
  FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.46
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.754
  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) =    0.52
  EFFECTIVE AREA(ACRES) =   33.50   AREA-AVERAGED Fm(INCH/HR) = 0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =       33.5      PEAK FLOW RATE(CFS) =     44.01
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =       33.5   TC(MIN.) =     14.46
  EFFECTIVE AREA(ACRES) =       33.50   AREA-AVERAGED Fm(INCH/HR)= 0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.980
  PEAK FLOW RATE(CFS)     =       44.01
============================================================================

============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                          Analysis prepared by:

                        Michael Baker International
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                          Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
  * RMV PA-4 WATERSHED 3 EXISTING CONDITION                            *
  * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
  * 10-YR EV MARCH 2019 CCHIU                                          *
  **********************************************************************

   FILE NAME: X40310EV.DAT
   TIME/DATE OF STUDY: 10:57 03/25/2019
  ================================================================================
   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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40300.00 TO NODE  40301.00 IS CODE = 21
  --------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
  ================================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =    316.00
   ELEVATION DATA: UPSTREAM(FEET) =    790.00  DOWNSTREAM(FEET) =    720.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.541
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.215
   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
   "CHAPARRAL,BROADLEAF"     -        0.39      0.30     1.000     0   9.54
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.68
   TOTAL AREA(ACRES) =        0.39   PEAK FLOW RATE(CFS) =        0.68

  ****************************************************************************
   FLOW PROCESS FROM NODE  40301.00 TO NODE  40302.00 IS CODE = 51
  --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    675.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   191.00   CHANNEL SLOPE = 0.2356
   CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
   *  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              -        0.88      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) =    1.41
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.95
   AVERAGE FLOW DEPTH(FEET) =    0.31   TRAVEL TIME(MIN.) =   0.64
   Tc(MIN.) =   10.18
   SUBAREA AREA(ACRES) =       0.88       SUBAREA RUNOFF(CFS) =    1.46
   EFFECTIVE AREA(ACRES) =      1.28      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) =       2.11

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.36   FLOW VELOCITY(FEET/SEC.) =   5.56
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40302.00 =     507.00 FEET.

  ****************************************************************************
   FLOW PROCESS FROM NODE  40302.00 TO NODE  40303.00 IS CODE = 51
  --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =    625.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   179.00   CHANNEL SLOPE = 0.2793
   CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
   *  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              -         0.84      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) =       2.78
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.28
 AVERAGE FLOW DEPTH(FEET) =  0.38   TRAVEL TIME(MIN.) =   0.48
 Tc(MIN.) =   10.66
 SUBAREA AREA(ACRES) =     0.84      SUBAREA RUNOFF(CFS) =    1.34
 EFFECTIVE AREA(ACRES) =      2.12    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       2.1       PEAK FLOW RATE(CFS) =      3.39

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   FLOW VELOCITY(FEET/SEC.) =  6.57
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40303.00 =    686.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  40303.00 TO NODE  40304.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    625.00  DOWNSTREAM(FEET) =    557.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   161.00   CHANNEL SLOPE = 0.4224
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.049
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap        SCS
     LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED              -         2.94      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) =       5.71
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.89
 AVERAGE FLOW DEPTH(FEET) =  0.46   TRAVEL TIME(MIN.) =   0.30
 Tc(MIN.) =   10.96
 SUBAREA AREA(ACRES) =     2.94      SUBAREA RUNOFF(CFS) =    4.63
 EFFECTIVE AREA(ACRES) =      5.06    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       5.1       PEAK FLOW RATE(CFS) =      7.96

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.53   FLOW VELOCITY(FEET/SEC.) =  9.47
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40304.00 =    847.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  40304.00 TO NODE  40305.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    557.00  DOWNSTREAM(FEET) =    548.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    42.00   CHANNEL SLOPE = 0.2143
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.040
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap        SCS
     LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED              -         1.68      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) =       9.27
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.78
 AVERAGE FLOW DEPTH(FEET) =  0.63   TRAVEL TIME(MIN.) =   0.09
 Tc(MIN.) =   11.05
 SUBAREA AREA(ACRES) =     1.68      SUBAREA RUNOFF(CFS) =    2.63
 EFFECTIVE AREA(ACRES) =      6.73    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       6.7       PEAK FLOW RATE(CFS) =     10.54

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.67   FLOW VELOCITY(FEET/SEC.) =  7.91
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40305.00 =    889.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  40305.00 TO NODE  40306.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    548.00  DOWNSTREAM(FEET) =    515.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   217.00   CHANNEL SLOPE = 0.1521
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.992
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap        SCS
     LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED              -         4.67      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) =      14.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.52
 AVERAGE FLOW DEPTH(FEET) =  0.79   TRAVEL TIME(MIN.) =   0.48
 Tc(MIN.) =   11.53
 SUBAREA AREA(ACRES) =     4.67      SUBAREA RUNOFF(CFS) =    7.12
 EFFECTIVE AREA(ACRES) =     11.41    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      11.4       PEAK FLOW RATE(CFS) =     17.37

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.85   FLOW VELOCITY(FEET/SEC.) =  7.98
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40306.00 =   1106.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  40306.00 TO NODE  40307.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    515.00  DOWNSTREAM(FEET) =    502.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE = 0.0722
```

```
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.948
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap        SCS
        LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         8.44       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) =       23.63
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.49
   AVERAGE FLOW DEPTH(FEET) =   1.10    TRAVEL TIME(MIN.) =   0.46
   Tc(MIN.) =   11.99
   SUBAREA AREA(ACRES) =      8.44      SUBAREA RUNOFF(CFS) =   12.52
   EFFECTIVE AREA(ACRES) =     19.84      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      19.8          PEAK FLOW RATE(CFS) =      29.44

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.19    FLOW VELOCITY(FEET/SEC.) =   6.87
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40307.00 =   1286.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40307.00 TO NODE  40308.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    502.00  DOWNSTREAM(FEET) =    469.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   553.00   CHANNEL SLOPE = 0.0597
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.833
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap        SCS
        LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        10.07       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) =       36.39
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.70
   AVERAGE FLOW DEPTH(FEET) =   1.35    TRAVEL TIME(MIN.) =   1.38
   Tc(MIN.) =   13.37
   SUBAREA AREA(ACRES) =     10.07      SUBAREA RUNOFF(CFS) =   13.90
   EFFECTIVE AREA(ACRES) =     29.92      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      29.9          PEAK FLOW RATE(CFS) =      41.27

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.41    FLOW VELOCITY(FEET/SEC.) =   6.93
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40308.00 =   1839.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40308.00 TO NODE  40309.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    469.00  DOWNSTREAM(FEET) =    433.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   631.00   CHANNEL SLOPE = 0.0571
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.727
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap        SCS
        LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         9.09       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) =       47.11
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.05
   AVERAGE FLOW DEPTH(FEET) =   1.49    TRAVEL TIME(MIN.) =   1.49
   Tc(MIN.) =   14.86
   SUBAREA AREA(ACRES) =      9.09      SUBAREA RUNOFF(CFS) =   11.67
   EFFECTIVE AREA(ACRES) =     39.01      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      39.0          PEAK FLOW RATE(CFS) =      50.10

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.53    FLOW VELOCITY(FEET/SEC.) =   7.15
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40309.00 =   2470.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40309.00 TO NODE  40310.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    433.00  DOWNSTREAM(FEET) =    406.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   595.00   CHANNEL SLOPE = 0.0454
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *    5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.638
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap        SCS
        LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        11.61       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) =       57.09
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.79
   AVERAGE FLOW DEPTH(FEET) =   1.67    TRAVEL TIME(MIN.) =   1.46
   Tc(MIN.) =   16.32
   SUBAREA AREA(ACRES) =     11.61      SUBAREA RUNOFF(CFS) =   13.99
   EFFECTIVE AREA(ACRES) =     50.62      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      50.6          PEAK FLOW RATE(CFS) =      60.97

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.71    FLOW VELOCITY(FEET/SEC.) =   6.92
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40310.00 =   3065.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40310.00 TO NODE  40311.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
     >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     406.00  DOWNSTREAM(FEET) =      353.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1122.00   CHANNEL SLOPE = 0.0472
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.532
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       15.32     0.30      0.897     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.897
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     69.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.99
  AVERAGE FLOW DEPTH(FEET) =  1.61   TRAVEL TIME(MIN.) =   2.08
  Tc(MIN.) =  18.40
  SUBAREA AREA(ACRES) =    15.32       SUBAREA RUNOFF(CFS) =   17.41
  EFFECTIVE AREA(ACRES) =     65.94      AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =        65.9         PEAK FLOW RATE(CFS) =       73.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.64   FLOW VELOCITY(FEET/SEC.) =   9.08
  LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40311.00 =     4187.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40311.00 TO NODE  40312.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     353.00  DOWNSTREAM(FEET) =      337.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  712.00   CHANNEL SLOPE = 0.0225
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.460
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        7.65     0.30      0.850     -
  USER-DEFINED               -        4.40     0.30      1.000     -
  USER-DEFINED               -        0.89     0.30      0.100     -
  USER-DEFINED               -        6.82     0.30      0.850     -
  USER-DEFINED               -        5.04     0.30      1.000     -
  USER-DEFINED               -        1.11     0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.885
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     87.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.21
  AVERAGE FLOW DEPTH(FEET) =  2.01   TRAVEL TIME(MIN.) =   1.65
  Tc(MIN.) =  20.05
  SUBAREA AREA(ACRES) =    25.91       SUBAREA RUNOFF(CFS) =   27.84
  EFFECTIVE AREA(ACRES) =     91.85      AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =        91.8         PEAK FLOW RATE(CFS) =       97.09

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  2.09   FLOW VELOCITY(FEET/SEC.) =   7.39
  LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40312.00 =     4899.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =  20.05
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.460
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.04     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) =     0.04       SUBAREA RUNOFF(CFS) =    0.04
  EFFECTIVE AREA(ACRES) =     91.89      AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =        91.9         PEAK FLOW RATE(CFS) =       97.13

*******************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =  20.05
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.460
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.17     0.30      0.850     -
  USER-DEFINED               -        0.01     0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.851
  SUBAREA AREA(ACRES) =     1.18       SUBAREA RUNOFF(CFS) =    1.28
  EFFECTIVE AREA(ACRES) =     93.07      AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =        93.1         PEAK FLOW RATE(CFS) =       98.41

*******************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =  20.05
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.460
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.18     0.30      1.000     -
  USER-DEFINED               -        4.59     0.30      1.000     -
  USER-DEFINED               -        4.27     0.30      0.850     -
  USER-DEFINED               -        3.00     0.30      1.000     -
  USER-DEFINED               -        0.16     0.30      1.000     -
  USER-DEFINED               -        0.22     0.30      0.100     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.932
```

```
  SUBAREA AREA(ACRES) =   12.42     SUBAREA RUNOFF(CFS) =   13.19
  EFFECTIVE AREA(ACRES) =    105.49   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      105.5     PEAK FLOW RATE(CFS) =     111.59

*******************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =   20.05
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.460
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        2.55     0.30     1.000      -
  USER-DEFINED               -       10.49     0.30     1.000      -
  USER-DEFINED               -        2.87     0.30     0.850      -
  USER-DEFINED               -        3.70     0.30     1.000      -
  USER-DEFINED               -        3.12     0.30     1.000      -
  USER-DEFINED               -        0.54     0.30     1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.981
  SUBAREA AREA(ACRES) =   23.27     SUBAREA RUNOFF(CFS) =   24.40
  EFFECTIVE AREA(ACRES) =    128.76   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      128.8     PEAK FLOW RATE(CFS) =     136.00

*******************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =   20.05
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.460
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        2.13     0.30     1.000      -
  USER-DEFINED               -        0.01     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) =    2.14     SUBAREA RUNOFF(CFS) =    2.23
  EFFECTIVE AREA(ACRES) =    130.90   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      130.9     PEAK FLOW RATE(CFS) =     138.23
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       130.9  TC(MIN.) =     20.05
  EFFECTIVE AREA(ACRES) =    130.90  AREA-AVERAGED Fm(INCH/HR)=  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.954
  PEAK FLOW RATE(CFS)   =     138.23
===============================================================================
===============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
**********************************************************************
         RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2013 Advanced Engineering Software (aes)
            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                       Analysis prepared by:

                     Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-4 WATERSHED 4 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 10-YR EV MARCH 2019 CCHIU                                          *
 **********************************************************************

  FILE NAME: X40410EV.DAT
  TIME/DATE OF STUDY: 10:57 03/25/2019
 ============================================================================
  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  60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40400.00 TO NODE  40401.00 IS CODE = 21
 --------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
  ELEVATION DATA: UPSTREAM(FEET) =   928.00  DOWNSTREAM(FEET) =   750.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   8.081
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.432
  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
  "CHAPARRAL,BROADLEAF"      -       0.75     0.30     1.000    0   8.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     1.44
  TOTAL AREA(ACRES) =       0.75   PEAK FLOW RATE(CFS) =      1.44

 ****************************************************************************
  FLOW PROCESS FROM NODE  40401.00 TO NODE  40402.00 IS CODE = 51
 --------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   750.00  DOWNSTREAM(FEET) =   710.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  107.00   CHANNEL SLOPE = 0.3738
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.389
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp       Ap    SCS
        LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED               -       1.17     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) =     2.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.78
  AVERAGE FLOW DEPTH(FEET) =   0.35   TRAVEL TIME(MIN.) =   0.26
  Tc(MIN.) =   8.34
  SUBAREA AREA(ACRES) =     1.17       SUBAREA RUNOFF(CFS) =    2.21
  EFFECTIVE AREA(ACRES) =     1.93      AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =      3.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   FLOW VELOCITY(FEET/SEC.) =   7.49
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40402.00 =    434.00 FEET.

 ****************************************************************************
  FLOW PROCESS FROM NODE  40402.00 TO NODE  40403.00 IS CODE = 51
 --------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.00  DOWNSTREAM(FEET) =   675.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  127.00   CHANNEL SLOPE = 0.2756
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.342
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
           DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp        Ap       SCS
               LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
         USER-DEFINED              -        1.05     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) =       4.59
         TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.14
         AVERAGE FLOW DEPTH(FEET) =  0.46   TRAVEL TIME(MIN.) =  0.30
         Tc(MIN.) =   8.64
         SUBAREA AREA(ACRES) =    1.05      SUBAREA RUNOFF(CFS) =   1.92
         EFFECTIVE AREA(ACRES) =     2.97    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) =        5.47

         END OF SUBAREA CHANNEL FLOW HYDRAULICS:
         DEPTH(FEET) = 0.49   FLOW VELOCITY(FEET/SEC.) =  7.50
         LONGEST FLOWPATH FROM NODE 40400.00 TO NODE 40403.00 =     561.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE 40403.00 TO NODE 40404.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =    650.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   113.00   CHANNEL SLOPE = 0.2212
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.304
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp        Ap       SCS
        LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        1.95     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) =       7.22
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.28
   AVERAGE FLOW DEPTH(FEET) =  0.58   TRAVEL TIME(MIN.) =  0.26
   Tc(MIN.) =   8.90
   SUBAREA AREA(ACRES) =    1.95      SUBAREA RUNOFF(CFS) =    3.52
   EFFECTIVE AREA(ACRES) =     4.92    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =        8.88

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.62   FLOW VELOCITY(FEET/SEC.) =  7.68
   LONGEST FLOWPATH FROM NODE 40400.00 TO NODE 40404.00 =     674.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE 40404.00 TO NODE 40405.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE = 0.1826
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

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   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.236
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp        Ap       SCS
        LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        2.15     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) =      10.75
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.54
   AVERAGE FLOW DEPTH(FEET) =  0.69   TRAVEL TIME(MIN.) =  0.48
   Tc(MIN.) =   9.38
   SUBAREA AREA(ACRES) =    2.15      SUBAREA RUNOFF(CFS) =    3.74
   EFFECTIVE AREA(ACRES) =     7.07    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        7.1       PEAK FLOW RATE(CFS) =       12.32

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.73   FLOW VELOCITY(FEET/SEC.) =  7.76
   LONGEST FLOWPATH FROM NODE 40400.00 TO NODE 40405.00 =     893.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE 40405.00 TO NODE 40406.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =    605.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    43.00   CHANNEL SLOPE = 0.1163
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.223
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp        Ap       SCS
        LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        2.90     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) =      14.83
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.94
   AVERAGE FLOW DEPTH(FEET) =  0.84   TRAVEL TIME(MIN.) =  0.10
   Tc(MIN.) =   9.49
   SUBAREA AREA(ACRES) =    2.90      SUBAREA RUNOFF(CFS) =    5.02
   EFFECTIVE AREA(ACRES) =     9.97    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =       17.25

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.90   FLOW VELOCITY(FEET/SEC.) =  7.17
   LONGEST FLOWPATH FROM NODE 40400.00 TO NODE 40406.00 =     936.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE 40406.00 TO NODE 40407.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    602.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    52.00   CHANNEL SLOPE = 0.0577
```

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  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.203
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        4.51      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) =      21.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.80
  AVERAGE FLOW DEPTH(FEET) =  1.10   TRAVEL TIME(MIN.) =   0.15
  Tc(MIN.) =    9.64
  SUBAREA AREA(ACRES) =     4.51       SUBAREA RUNOFF(CFS) =    7.73
  EFFECTIVE AREA(ACRES) =      14.48      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       14.5          PEAK FLOW RATE(CFS) =       24.80

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.17   FLOW VELOCITY(FEET/SEC.) =  6.04
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40407.00 =    988.00 FEET.

***********************************************************************
  FLOW PROCESS FROM NODE  40407.00 TO NODE  40408.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    602.00  DOWNSTREAM(FEET) =    559.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   533.00   CHANNEL SLOPE = 0.0807
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.058
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        5.99      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) =      29.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.17
  AVERAGE FLOW DEPTH(FEET) =  1.17   TRAVEL TIME(MIN.) =   1.24
  Tc(MIN.) =   10.87
  SUBAREA AREA(ACRES) =     5.99       SUBAREA RUNOFF(CFS) =    9.47
  EFFECTIVE AREA(ACRES) =      20.47      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       20.5          PEAK FLOW RATE(CFS) =       32.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.22   FLOW VELOCITY(FEET/SEC.) =  7.30
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40408.00 =   1521.00 FEET.

***********************************************************************
  FLOW PROCESS FROM NODE  40408.00 TO NODE  40409.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    559.00  DOWNSTREAM(FEET) =    509.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   702.00   CHANNEL SLOPE = 0.0712
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.904
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        6.05      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) =      36.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.23
  AVERAGE FLOW DEPTH(FEET) =  1.30   TRAVEL TIME(MIN.) =   1.62
  Tc(MIN.) =   12.49
  SUBAREA AREA(ACRES) =     6.05       SUBAREA RUNOFF(CFS) =    8.73
  EFFECTIVE AREA(ACRES) =      26.51      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       26.5          PEAK FLOW RATE(CFS) =       38.28

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.32   FLOW VELOCITY(FEET/SEC.) =  7.27
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40409.00 =   2223.00 FEET.

***********************************************************************
  FLOW PROCESS FROM NODE  40409.00 TO NODE  40447.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    509.00  DOWNSTREAM(FEET) =    482.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   440.00   CHANNEL SLOPE = 0.0614
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.820
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        6.09      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) =      42.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.05
  AVERAGE FLOW DEPTH(FEET) =  1.42   TRAVEL TIME(MIN.) =   1.04
  Tc(MIN.) =   13.53
  SUBAREA AREA(ACRES) =     6.09       SUBAREA RUNOFF(CFS) =    8.33
  EFFECTIVE AREA(ACRES) =      32.60      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       32.6          PEAK FLOW RATE(CFS) =       44.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.44   FLOW VELOCITY(FEET/SEC.) =  7.12
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =   2663.00 FEET.

***********************************************************************
  FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 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.) = 13.53
  RAINFALL INTENSITY(INCH/HR) =   1.82
  AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30
  AREA-AVERAGED Ap = 1.00
  EFFECTIVE STREAM AREA(ACRES) =       32.60
  TOTAL STREAM AREA(ACRES) =       32.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =        44.61

*****************************************************************
  FLOW PROCESS FROM NODE  40410.00 TO NODE  40411.00 IS CODE = 21
-----------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=============================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  329.00
  ELEVATION DATA: UPSTREAM(FEET) =   878.00 DOWNSTREAM(FEET) =    726.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.371
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.384
  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
  "CHAPARRAL,BROADLEAF"    -         0.69      0.30    1.000     0    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      1.29
  TOTAL AREA(ACRES) =       0.69   PEAK FLOW RATE(CFS) =        1.29

*****************************************************************
  FLOW PROCESS FROM NODE  40411.00 TO NODE  40412.00 IS CODE = 51
-----------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================
  ELEVATION DATA: UPSTREAM(FEET) =   726.00 DOWNSTREAM(FEET) =    687.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  101.00   CHANNEL SLOPE = 0.3861
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.345
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         0.91      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) =      2.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.70
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   0.25
  Tc(MIN.) =    8.62
  SUBAREA AREA(ACRES) =      0.91     SUBAREA RUNOFF(CFS) =    1.68
  EFFECTIVE AREA(ACRES) =       1.60    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
```

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  TOTAL AREA(ACRES) =        1.6      PEAK FLOW RATE(CFS) =        2.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   FLOW VELOCITY(FEET/SEC.) =   7.19
  LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40412.00 =      430.00 FEET.

*****************************************************************
  FLOW PROCESS FROM NODE  40412.00 TO NODE  40413.00 IS CODE = 51
-----------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================
  ELEVATION DATA: UPSTREAM(FEET) =   687.00 DOWNSTREAM(FEET) =    658.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  153.00   CHANNEL SLOPE = 0.1895
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.282
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         0.96      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) =      3.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.91
  AVERAGE FLOW DEPTH(FEET) =   0.46   TRAVEL TIME(MIN.) =   0.43
  Tc(MIN.) =    9.05
  SUBAREA AREA(ACRES) =      0.96     SUBAREA RUNOFF(CFS) =    1.71
  EFFECTIVE AREA(ACRES) =       2.55    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) =        4.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.50   FLOW VELOCITY(FEET/SEC.) =   6.10
  LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40413.00 =      583.00 FEET.

*****************************************************************
  FLOW PROCESS FROM NODE  40413.00 TO NODE  40414.00 IS CODE = 51
-----------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================
  ELEVATION DATA: UPSTREAM(FEET) =   658.00 DOWNSTREAM(FEET) =    615.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  247.00   CHANNEL SLOPE = 0.1741
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  5 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             -         2.51      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) =      6.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.57
  AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   0.63
  Tc(MIN.) =    9.68
  SUBAREA AREA(ACRES) =      2.51     SUBAREA RUNOFF(CFS) =    4.28
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   EFFECTIVE AREA(ACRES) =     5.06     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        5.1       PEAK FLOW RATE(CFS) =       8.64

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.64   FLOW VELOCITY(FEET/SEC.) =   6.95
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40414.00 =     830.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40414.00 TO NODE  40415.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    567.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    414.00   CHANNEL SLOPE = 0.1159
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  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             -        4.38     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) =       12.14
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.50
   AVERAGE FLOW DEPTH(FEET) =   0.79   TRAVEL TIME(MIN.) =   1.06
   Tc(MIN.) =  10.74
   SUBAREA AREA(ACRES) =     4.38       SUBAREA RUNOFF(CFS) =    6.98
   EFFECTIVE AREA(ACRES) =      9.44     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        9.4       PEAK FLOW RATE(CFS) =      15.06

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.85   FLOW VELOCITY(FEET/SEC.) =   6.92
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40415.00 =    1244.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40415.00 TO NODE  40416.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    567.00  DOWNSTREAM(FEET) =    538.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    301.00   CHANNEL SLOPE = 0.0963
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 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             -        7.77     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) =       21.00
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.05
   AVERAGE FLOW DEPTH(FEET) =   1.00   TRAVEL TIME(MIN.) =   0.71
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   Tc(MIN.) =  11.45
   SUBAREA AREA(ACRES) =     7.77       SUBAREA RUNOFF(CFS) =   11.88
   EFFECTIVE AREA(ACRES) =     17.21     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) =      26.31

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.09   FLOW VELOCITY(FEET/SEC.) =   7.41
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40416.00 =    1545.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40416.00 TO NODE  40417.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    538.00  DOWNSTREAM(FEET) =    529.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    116.00   CHANNEL SLOPE = 0.0776
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.974
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap       SCS
        LAND USE          GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -       16.20     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) =       38.53
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.51
   AVERAGE FLOW DEPTH(FEET) =   1.31   TRAVEL TIME(MIN.) =   0.26
   Tc(MIN.) =  11.71
   SUBAREA AREA(ACRES) =    16.20       SUBAREA RUNOFF(CFS) =   24.42
   EFFECTIVE AREA(ACRES) =     33.41     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       33.4       PEAK FLOW RATE(CFS) =      50.35

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.44   FLOW VELOCITY(FEET/SEC.) =   8.04
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40417.00 =    1661.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40417.00 TO NODE  40447.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    529.00  DOWNSTREAM(FEET) =    482.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    891.00   CHANNEL SLOPE = 0.0527
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.804
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap       SCS
        LAND USE          GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
   USER-DEFINED             -       14.55     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) =       60.20
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    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    7.28
    AVERAGE FLOW DEPTH(FEET) =   1.66    TRAVEL TIME(MIN.) =    2.04
    Tc(MIN.) =   13.75
    SUBAREA AREA(ACRES) =    14.55      SUBAREA RUNOFF(CFS) =   19.69
    EFFECTIVE AREA(ACRES) =      47.96      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =       48.0         PEAK FLOW RATE(CFS) =       64.92

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =   1.71   FLOW VELOCITY(FEET/SEC.) =   7.43
    LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40447.00 =    2552.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 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.) =   13.75
   RAINFALL INTENSITY(INCH/HR) =   1.80
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =      47.96
   TOTAL STREAM AREA(ACRES) =      47.96
   PEAK FLOW RATE(CFS) AT CONFLUENCE =       64.92

   ** CONFLUENCE DATA **
   STREAM     Q      Tc   Intensity  Fp(Fm)    Ap      Ae    HEADWATER
   NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1      44.61  13.53   1.820  0.30( 0.30) 1.00     32.6  40400.00
     2      64.92  13.75   1.804  0.30( 0.30) 1.00     48.0  40410.00

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

   ** PEAK FLOW RATE TABLE **
   STREAM     Q      Tc   Intensity  Fp(Fm)    Ap      Ae    HEADWATER
   NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1     109.19  13.53   1.820  0.30( 0.30) 1.00     79.8  40400.00
     2     109.05  13.75   1.804  0.30( 0.30) 1.00     80.6  40410.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      109.19    Tc(MIN.) =    13.53
   EFFECTIVE AREA(ACRES) =      79.80    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       80.6
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE =   10
---------------------------------------------------------------------------
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
===========================================================================

*****************************************************************************
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    FLOW PROCESS FROM NODE  40420.00 TO NODE  40421.00 IS CODE =   21
---------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
   ELEVATION DATA: UPSTREAM(FEET) =   925.00 DOWNSTREAM(FEET) =    815.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.799
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.318
   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
   "CHAPARRAL,BROADLEAF"     -        0.31     0.30      1.000      0    8.80
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.56
   TOTAL AREA(ACRES) =        0.31   PEAK FLOW RATE(CFS) =        0.56

*****************************************************************************
   FLOW PROCESS FROM NODE  40421.00 TO NODE  40422.00 IS CODE =   51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   815.00 DOWNSTREAM(FEET) =    743.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   123.00   CHANNEL SLOPE = 0.5854
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.271
   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      -
   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) =       0.82
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    6.17
   AVERAGE FLOW DEPTH(FEET) =   0.21    TRAVEL TIME(MIN.) =    0.33
   Tc(MIN.) =    9.13
   SUBAREA AREA(ACRES) =     0.30        SUBAREA RUNOFF(CFS) =    0.53
   EFFECTIVE AREA(ACRES) =       0.60      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =        1.07

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   0.23   FLOW VELOCITY(FEET/SEC.) =   6.54
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40422.00 =     444.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40422.00 TO NODE  40423.00 IS CODE =   51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   743.00  DOWNSTREAM(FEET) =    665.00
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   CHANNEL LENGTH THRU SUBAREA(FEET) =   142.00   CHANNEL SLOPE = 0.5493
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 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
   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
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.77
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.24
   AVERAGE FLOW DEPTH(FEET) =  0.29   TRAVEL TIME(MIN.) =   0.33
   Tc(MIN.) =    9.46
   SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    1.39
   EFFECTIVE AREA(ACRES) =     1.40      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       1.4         PEAK FLOW RATE(CFS) =      2.44

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.32   FLOW VELOCITY(FEET/SEC.) =  7.77
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40423.00 =    586.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  40423.00 TO NODE  40424.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    665.00  DOWNSTREAM(FEET) =    630.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    99.00   CHANNEL SLOPE = 0.3535
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -        0.32     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) =      2.71
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.84
   AVERAGE FLOW DEPTH(FEET) =  0.36   TRAVEL TIME(MIN.) =   0.24
   Tc(MIN.) =    9.70
   SUBAREA AREA(ACRES) =    0.32      SUBAREA RUNOFF(CFS) =    0.54
   EFFECTIVE AREA(ACRES) =     1.72      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       1.7         PEAK FLOW RATE(CFS) =      2.94

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.38   FLOW VELOCITY(FEET/SEC.) =  6.91
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40424.00 =    685.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  40424.00 TO NODE  40425.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    615.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    35.00   CHANNEL SLOPE = 0.4286
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.186
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        1.87     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) =      4.52
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.37
   AVERAGE FLOW DEPTH(FEET) =  0.42   TRAVEL TIME(MIN.) =   0.07
   Tc(MIN.) =    9.77
   SUBAREA AREA(ACRES) =    1.87      SUBAREA RUNOFF(CFS) =    3.17
   EFFECTIVE AREA(ACRES) =     3.59      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) =      6.10

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.48   FLOW VELOCITY(FEET/SEC.) =  8.97
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40425.00 =    720.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  40425.00 TO NODE  40426.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    574.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   260.00   CHANNEL SLOPE = 0.1577
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.106
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        1.19     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) =      7.06
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.42
   AVERAGE FLOW DEPTH(FEET) =  0.61   TRAVEL TIME(MIN.) =   0.68
   Tc(MIN.) =   10.44
   SUBAREA AREA(ACRES) =    1.19      SUBAREA RUNOFF(CFS) =    1.93
   EFFECTIVE AREA(ACRES) =     4.78      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       4.8         PEAK FLOW RATE(CFS) =      7.77

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.63   FLOW VELOCITY(FEET/SEC.) =  6.56
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40426.00 =    980.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  40426.00 TO NODE  40427.00 IS CODE = 51
--------------------------------------------------------------------------
```

```
      >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
      >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
    ==================================================================================
      ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =    533.00
      CHANNEL LENGTH THRU SUBAREA(FEET) =   322.00   CHANNEL SLOPE = 0.1273
      CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
      *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.015
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
            LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED                -         1.82     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) =      9.17
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.29
      AVERAGE FLOW DEPTH(FEET) =   0.70   TRAVEL TIME(MIN.) =   0.85
      Tc(MIN.) =   11.30
      SUBAREA AREA(ACRES) =      1.82        SUBAREA RUNOFF(CFS) =     2.81
      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) =     10.18

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) =  0.72   FLOW VELOCITY(FEET/SEC.) =   6.51
      LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40427.00 =    1302.00 FEET.

    ********************************************************************************
      FLOW PROCESS FROM NODE  40427.00 TO NODE  40428.00 IS CODE = 51
    --------------------------------------------------------------------------------
      >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
      >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
    ==================================================================================
      ELEVATION DATA: UPSTREAM(FEET) =    533.00  DOWNSTREAM(FEET) =    521.00
      CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE = 0.0750
      CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
      *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.971
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
            LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED                -         6.79     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) =     15.29
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.92
      AVERAGE FLOW DEPTH(FEET) =   0.93   TRAVEL TIME(MIN.) =   0.45
      Tc(MIN.) =   11.75
      SUBAREA AREA(ACRES) =      6.79        SUBAREA RUNOFF(CFS) =    10.21
      EFFECTIVE AREA(ACRES) =      13.39     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) =     20.14

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) =  1.03   FLOW VELOCITY(FEET/SEC.) =   6.29
      LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40428.00 =    1462.00 FEET.

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

```
      FLOW PROCESS FROM NODE  40428.00 TO NODE  40429.00 IS CODE = 51
    --------------------------------------------------------------------------------
      >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
      >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
    ==================================================================================
      ELEVATION DATA: UPSTREAM(FEET) =    521.00  DOWNSTREAM(FEET) =    508.00
      CHANNEL LENGTH THRU SUBAREA(FEET) =   221.00   CHANNEL SLOPE = 0.0588
      CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
      *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.915
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
            LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED                -         3.74     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) =     22.85
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.94
      AVERAGE FLOW DEPTH(FEET) =   1.13   TRAVEL TIME(MIN.) =   0.62
      Tc(MIN.) =   12.37
      SUBAREA AREA(ACRES) =      3.74        SUBAREA RUNOFF(CFS) =     5.44
      EFFECTIVE AREA(ACRES) =      17.13     AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
      TOTAL AREA(ACRES) =       17.1        PEAK FLOW RATE(CFS) =     24.90

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) =  1.17   FLOW VELOCITY(FEET/SEC.) =   6.06
      LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40429.00 =    1683.00 FEET.

    ********************************************************************************
      FLOW PROCESS FROM NODE  40429.00 TO NODE  40446.00 IS CODE = 51
    --------------------------------------------------------------------------------
      >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
      >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
    ==================================================================================
      ELEVATION DATA: UPSTREAM(FEET) =    508.00  DOWNSTREAM(FEET) =    489.00
      CHANNEL LENGTH THRU SUBAREA(FEET) =   306.00   CHANNEL SLOPE = 0.0621
      CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
      *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.847
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
            LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED                -         0.99     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) =     25.59
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.23
      AVERAGE FLOW DEPTH(FEET) =   1.17   TRAVEL TIME(MIN.) =   0.82
      Tc(MIN.) =   13.19
      SUBAREA AREA(ACRES) =      0.99        SUBAREA RUNOFF(CFS) =     1.38
      EFFECTIVE AREA(ACRES) =      18.12     AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
      TOTAL AREA(ACRES) =       18.1        PEAK FLOW RATE(CFS) =     25.23

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) =  1.16   FLOW VELOCITY(FEET/SEC.) =   6.22
      LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =    1989.00 FEET.
```

```
*****************************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

*****************************************************************************
  FLOW PROCESS FROM NODE  40430.00 TO NODE  40431.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   302.00
  ELEVATION DATA: UPSTREAM(FEET) =   1035.00  DOWNSTREAM(FEET) =    875.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     7.870
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.468
  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
  "CHAPARRAL,BROADLEAF"      -       0.40     0.30    1.000     0    7.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.79
  TOTAL AREA(ACRES) =      0.40    PEAK FLOW RATE(CFS) =       0.79

*****************************************************************************
  FLOW PROCESS FROM NODE  40431.00 TO NODE  40432.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    875.00  DOWNSTREAM(FEET) =    800.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE = 0.4688
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.398
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       0.65     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) =      1.40
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.41
  AVERAGE FLOW DEPTH(FEET) =  0.27    TRAVEL TIME(MIN.) =   0.42
  Tc(MIN.) =    8.29
  SUBAREA AREA(ACRES) =     0.65        SUBAREA RUNOFF(CFS) =    1.22
  EFFECTIVE AREA(ACRES) =     1.05     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) =     1.99

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   FLOW VELOCITY(FEET/SEC.) =  6.98
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40432.00 =    462.00 FEET.
```

```
*****************************************************************************
  FLOW PROCESS FROM NODE  40432.00 TO NODE  40433.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    712.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE = 0.5867
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.352
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       1.08     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) =      2.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.58
  AVERAGE FLOW DEPTH(FEET) =  0.34    TRAVEL TIME(MIN.) =   0.29
  Tc(MIN.) =    8.58
  SUBAREA AREA(ACRES) =     1.08        SUBAREA RUNOFF(CFS) =    2.00
  EFFECTIVE AREA(ACRES) =     2.13     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       2.1        PEAK FLOW RATE(CFS) =      3.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   FLOW VELOCITY(FEET/SEC.) =  9.16
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40433.00 =    612.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40433.00 TO NODE  40434.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    712.00  DOWNSTREAM(FEET) =    657.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   120.00   CHANNEL SLOPE = 0.4583
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.318
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       1.98     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) =      5.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.02
  AVERAGE FLOW DEPTH(FEET) =  0.46    TRAVEL TIME(MIN.) =   0.22
  Tc(MIN.) =    8.80
  SUBAREA AREA(ACRES) =     1.98        SUBAREA RUNOFF(CFS) =    3.60
  EFFECTIVE AREA(ACRES) =     4.11     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       4.1        PEAK FLOW RATE(CFS) =      7.48

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.51    FLOW VELOCITY(FEET/SEC.) =    9.72
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40434.00 =     732.00 FEET.

***********************************************************************
  FLOW PROCESS FROM NODE  40434.00 TO NODE  40435.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     657.00  DOWNSTREAM(FEET) =      620.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  161.00   CHANNEL SLOPE = 0.2298
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.270
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        2.34      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) =      9.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.01
  AVERAGE FLOW DEPTH(FEET) =  0.63    TRAVEL TIME(MIN.) =   0.33
  Tc(MIN.) =   9.13
  SUBAREA AREA(ACRES) =    2.34      SUBAREA RUNOFF(CFS) =   4.15
  EFFECTIVE AREA(ACRES) =     6.46     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) =     11.45

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.68    FLOW VELOCITY(FEET/SEC.) =    8.35
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40435.00 =     893.00 FEET.

***********************************************************************
  FLOW PROCESS FROM NODE  40435.00 TO NODE  40445.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     620.00  DOWNSTREAM(FEET) =      579.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  358.00   CHANNEL SLOPE = 0.1145
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   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              -        1.75      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) =     12.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.63
  AVERAGE FLOW DEPTH(FEET) =  0.81    TRAVEL TIME(MIN.) =   0.90
  Tc(MIN.) =  10.03
  SUBAREA AREA(ACRES) =    1.75      SUBAREA RUNOFF(CFS) =   2.93
  EFFECTIVE AREA(ACRES) =     8.21     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.2        PEAK FLOW RATE(CFS) =     13.70
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.83    FLOW VELOCITY(FEET/SEC.) =    6.68
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40445.00 =    1251.00 FEET.

***********************************************************************
  FLOW PROCESS FROM NODE  40445.00 TO NODE  40445.00 IS CODE =  1
-----------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=======================================================================
  TOTAL NUMBER OF STREAMS = 2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.03
  RAINFALL INTENSITY(INCH/HR) =   2.15
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =        8.21
  TOTAL STREAM AREA(ACRES) =         8.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =        13.70

***********************************************************************
  FLOW PROCESS FROM NODE  40440.00 TO NODE  40441.00 IS CODE = 21
-----------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=======================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  319.00
  ELEVATION DATA: UPSTREAM(FEET) =    1020.00  DOWNSTREAM(FEET) =     898.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.351
  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
  "CHAPARRAL,BROADLEAF"     -        0.75      0.30     1.000     0    8.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      1.38
  TOTAL AREA(ACRES) =        0.75   PEAK FLOW RATE(CFS) =       1.38

***********************************************************************
  FLOW PROCESS FROM NODE  40441.00 TO NODE  40442.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     898.00  DOWNSTREAM(FEET) =     760.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  253.00   CHANNEL SLOPE = 0.5455
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.270
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        0.89      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) =        2.17
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.63
 AVERAGE FLOW DEPTH(FEET) =   0.31    TRAVEL TIME(MIN.) =   0.55
 Tc(MIN.) =    9.14
 SUBAREA AREA(ACRES) =      0.89       SUBAREA RUNOFF(CFS) =    1.57
 EFFECTIVE AREA(ACRES) =      1.64     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         1.6       PEAK FLOW RATE(CFS) =        2.90

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35   FLOW VELOCITY(FEET/SEC.) =   8.08
 LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40442.00 =    572.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  40442.00 TO NODE  40443.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   760.00 DOWNSTREAM(FEET) =    653.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  188.00   CHANNEL SLOPE = 0.5691
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.224
 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) =        4.47
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.23
 AVERAGE FLOW DEPTH(FEET) =   0.40    TRAVEL TIME(MIN.) =   0.34
 Tc(MIN.) =    9.48
 SUBAREA AREA(ACRES) =      1.80       SUBAREA RUNOFF(CFS) =    3.12
 EFFECTIVE AREA(ACRES) =      3.44     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         3.4       PEAK FLOW RATE(CFS) =        5.96

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   FLOW VELOCITY(FEET/SEC.) =   9.93
 LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40443.00 =    760.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  40443.00 TO NODE  40444.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   653.00 DOWNSTREAM(FEET) =    605.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  198.00   CHANNEL SLOPE = 0.2424
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.171
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA        Fp        Ap      SCS
```

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        LAND USE          GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED          -        3.16        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) =        8.62
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.98
 AVERAGE FLOW DEPTH(FEET) =   0.60    TRAVEL TIME(MIN.) =   0.41
 Tc(MIN.) =    9.89
 SUBAREA AREA(ACRES) =      3.16       SUBAREA RUNOFF(CFS) =    5.32
 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) =       11.11

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.66   FLOW VELOCITY(FEET/SEC.) =   8.48
 LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40444.00 =    958.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  40444.00 TO NODE  40445.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   605.00 DOWNSTREAM(FEET) =    579.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  243.00   CHANNEL SLOPE = 0.1070
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.096
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/    SCS SOIL    AREA        Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED          -        1.67        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) =       12.47
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.40
 AVERAGE FLOW DEPTH(FEET) =   0.81    TRAVEL TIME(MIN.) =   0.63
 Tc(MIN.) =   10.52
 SUBAREA AREA(ACRES) =      1.67       SUBAREA RUNOFF(CFS) =    2.71
 EFFECTIVE AREA(ACRES) =      8.27     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         8.3       PEAK FLOW RATE(CFS) =       13.38

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.83   FLOW VELOCITY(FEET/SEC.) =   6.52
 LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40445.00 =   1201.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  40445.00 TO NODE  40445.00 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.) =   10.52
 RAINFALL INTENSITY(INCH/HR) =   2.10
 AREA-AVERAGED Fm(INCH/HR) =  0.30
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      AREA-AVERAGED Fp(INCH/HR) =  0.30
      AREA-AVERAGED Ap =  1.00
      EFFECTIVE STREAM AREA(ACRES) =        8.27
      TOTAL STREAM AREA(ACRES) =        8.27
      PEAK FLOW RATE(CFS) AT CONFLUENCE =        13.38

      ** CONFLUENCE DATA **
      STREAM      Q       Tc    Intensity  Fp(Fm)    Ap     Ae    HEADWATER
      NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
        1       13.70   10.03   2.153  0.30( 0.30) 1.00      8.2  40430.00
        2       13.38   10.52   2.096  0.30( 0.30) 1.00      8.3  40440.00

      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       26.86   10.03   2.153  0.30( 0.30) 1.00     16.1  40430.00
        2       26.65   10.52   2.096  0.30( 0.30) 1.00     16.5  40440.00

      COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
      PEAK FLOW RATE(CFS) =       26.86    Tc(MIN.) =    10.03
      EFFECTIVE AREA(ACRES) =       16.10    AREA-AVERAGED Fm(INCH/HR) = 0.30
      AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap =  1.00
      TOTAL AREA(ACRES) =       16.5
      LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40445.00 =    1251.00 FEET.

 ********************************************************************************
   FLOW PROCESS FROM NODE  40445.00 TO NODE  40446.00 IS CODE = 51
 ------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     579.00  DOWNSTREAM(FEET) =     489.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =     636.00    CHANNEL SLOPE = 0.1415
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 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              -         3.79     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) =       29.79
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.88
   AVERAGE FLOW DEPTH(FEET) =  1.06    TRAVEL TIME(MIN.) =   1.19
   Tc(MIN.) =   11.23
   SUBAREA AREA(ACRES) =     3.79      SUBAREA RUNOFF(CFS) =    5.86
   EFFECTIVE AREA(ACRES) =     19.88      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      20.3        PEAK FLOW RATE(CFS) =      30.81

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.07   FLOW VELOCITY(FEET/SEC.) =  8.92
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40446.00 =   1887.00 FEET.
```

```
 ********************************************************************************
   FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE = 11
 ------------------------------------------------------------------------------
   >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
 ==============================================================================
   ** MAIN STREAM CONFLUENCE DATA **
   STREAM      Q       Tc    Intensity  Fp(Fm)    Ap     Ae    HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
     1       30.81   11.23   2.022  0.30( 0.30) 1.00     19.9  40430.00
     2       30.52   11.73   1.973  0.30( 0.30) 1.00     20.3  40440.00
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40446.00 =   1887.00 FEET.

   ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM      Q       Tc    Intensity  Fp(Fm)    Ap     Ae    HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
     1       25.23   13.19   1.847  0.30( 0.30) 1.00     18.1  40420.00
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =   1989.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM      Q       Tc    Intensity  Fp(Fm)    Ap     Ae    HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
     1       54.72   11.23   2.022  0.30( 0.30) 1.00     35.3  40430.00
     2       54.78   11.73   1.973  0.30( 0.30) 1.00     36.4  40440.00
     3       53.45   13.19   1.847  0.30( 0.30) 1.00     38.4  40420.00
   TOTAL AREA(ACRES) =       38.4

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =       54.78   Tc(MIN.) =   11.726
   EFFECTIVE AREA(ACRES) =       36.38   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       38.4
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =   1989.00 FEET.

 ********************************************************************************
   FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE = 12
 ------------------------------------------------------------------------------
   >>>>>CLEAR MEMORY BANK # 2 <<<<<
 ==============================================================================

 ********************************************************************************
   FLOW PROCESS FROM NODE  40446.00 TO NODE  40447.00 IS CODE = 51
 ------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    489.00  DOWNSTREAM(FEET) =    482.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    167.00    CHANNEL SLOPE = 0.0419
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.934
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         0.59     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) =       55.22
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   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.56
   AVERAGE FLOW DEPTH(FEET) =   1.68    TRAVEL TIME(MIN.) =   0.42
   Tc(MIN.) =   12.15
   SUBAREA AREA(ACRES) =       0.59      SUBAREA RUNOFF(CFS) =     0.87
   EFFECTIVE AREA(ACRES) =       36.97      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        39.0      PEAK FLOW RATE(CFS) =      54.78
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   1.67   FLOW VELOCITY(FEET/SEC.) =   6.52
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40447.00 =    2156.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE =  11
-----------------------------------------------------------------------
   >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
=======================================================================

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM      Q      Tc   Intensity  Fp(Fm)    Ap     Ae    HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)   NODE
     1       54.72  11.65   1.980  0.30( 0.30) 1.00      35.9  40430.00
     2       54.78  12.15   1.934  0.30( 0.30) 1.00      37.0  40440.00
     3       53.45  13.61   1.814  0.30( 0.30) 1.00      39.0  40420.00
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40447.00 =    2156.00 FEET.

   ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM      Q      Tc   Intensity  Fp(Fm)    Ap     Ae    HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)   NODE
     1      109.19  13.53   1.820  0.30( 0.30) 1.00      79.8  40400.00
     2      109.05  13.75   1.804  0.30( 0.30) 1.00      80.6  40410.00
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc   Intensity  Fp(Fm)    Ap     Ae    HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)   NODE
     1      158.61  11.65   1.980  0.30( 0.30) 1.00     104.6  40430.00
     2      160.14  12.15   1.934  0.30( 0.30) 1.00     108.6  40440.00
     3      162.71  13.53   1.820  0.30( 0.30) 1.00     118.7  40400.00
     4      162.59  13.61   1.814  0.30( 0.30) 1.00     119.1  40420.00
     5      162.14  13.75   1.804  0.30( 0.30) 1.00     119.5  40410.00
      TOTAL AREA(ACRES) =      119.5

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =       162.71  Tc(MIN.) =   13.533
   EFFECTIVE AREA(ACRES) =     118.67  AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      119.5
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE =  12
-----------------------------------------------------------------------
   >>>>>CLEAR MEMORY BANK # 1 <<<<<
=======================================================================

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   FLOW PROCESS FROM NODE  40447.00 TO NODE  40448.00 IS CODE =  51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    482.00  DOWNSTREAM(FEET) =    447.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   926.00    CHANNEL SLOPE = 0.0378
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.695
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        24.32     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) =     177.98
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.43
   AVERAGE FLOW DEPTH(FEET) =   2.65    TRAVEL TIME(MIN.) =   1.83
   Tc(MIN.) =   15.36
   SUBAREA AREA(ACRES) =    24.32      SUBAREA RUNOFF(CFS) = 30.53
   EFFECTIVE AREA(ACRES) =     142.99      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       143.9      PEAK FLOW RATE(CFS) =      179.53

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   2.67   FLOW VELOCITY(FEET/SEC.) =   8.42
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40448.00 =    3589.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  40448.00 TO NODE  40449.00 IS CODE =  51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =    433.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   443.00    CHANNEL SLOPE = 0.0316
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.644
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -       108.49     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) =     245.14
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.53
   AVERAGE FLOW DEPTH(FEET) =   3.09    TRAVEL TIME(MIN.) =   0.87
   Tc(MIN.) =   16.23
   SUBAREA AREA(ACRES) =   108.49      SUBAREA RUNOFF(CFS) = 131.20
   EFFECTIVE AREA(ACRES) =     251.48      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       252.3      PEAK FLOW RATE(CFS) =      304.12

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   3.35   FLOW VELOCITY(FEET/SEC.) =   9.01
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40449.00 =    4032.00 FEET.
```

```
     ** PEAK FLOW RATE TABLE **
      STREAM       Q      Tc   Intensity   Fp(Fm)     Ap       Ae     HEADWATER
      NUMBER     (CFS)  (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)    NODE
         1       312.21  14.35   1.761   0.30( 0.30) 1.00     237.4   40430.00
         2       310.23  14.85   1.728   0.30( 0.30) 1.00     241.4   40440.00
         3       304.12  16.23   1.644   0.30( 0.30) 1.00     251.5   40400.00
         4       303.53  16.31   1.639   0.30( 0.30) 1.00     251.9   40420.00
         5       302.32  16.45   1.631   0.30( 0.30) 1.00     252.3   40410.00
      NEW PEAK FLOW DATA ARE:
      PEAK FLOW RATE(CFS) =    312.21  Tc(MIN.) =   14.35
      AREA-AVERAGED Fm(INCH/HR) = 0.30  AREA-AVERAGED Fp(INCH/HR) = 0.30
      AREA-AVERAGED Ap = 1.00  EFFECTIVE AREA(ACRES) =      237.43

*********************************************************************
    FLOW PROCESS FROM NODE  40449.00 TO NODE  40450.00 IS CODE =  51
--------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
====================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    433.00 DOWNSTREAM(FEET) =    398.00
    CHANNEL LENGTH THRU SUBAREA(FEET) = 1065.00   CHANNEL SLOPE = 0.0329
    CHANNEL BASE(FEET) =    0.00  "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.642
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
     USER-DEFINED             -        36.85    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) =    334.48
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.36
    AVERAGE FLOW DEPTH(FEET) =  3.45    TRAVEL TIME(MIN.) =  1.90
    Tc(MIN.) =  16.25
    SUBAREA AREA(ACRES) =   36.85      SUBAREA RUNOFF(CFS) =   44.52
    EFFECTIVE AREA(ACRES) =   274.28     AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =     289.2        PEAK FLOW RATE(CFS) =    331.38

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 3.44   FLOW VELOCITY(FEET/SEC.) =  9.35
    LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40450.00 =   5097.00 FEET.

     ** PEAK FLOW RATE TABLE **
      STREAM       Q      Tc   Intensity   Fp(Fm)     Ap       Ae     HEADWATER
      NUMBER     (CFS)  (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)    NODE
         1       331.38  16.25   1.642   0.30( 0.30) 1.00     274.3   40430.00
         2       329.24  16.75   1.615   0.30( 0.30) 1.00     278.3   40440.00
         3       322.82  18.14   1.544   0.30( 0.30) 1.00     288.3   40400.00
         4       322.19  18.22   1.540   0.30( 0.30) 1.00     288.7   40420.00
         5       321.01  18.36   1.533   0.30( 0.30) 1.00     289.2   40410.00
      NEW PEAK FLOW DATA ARE:
      PEAK FLOW RATE(CFS) =    331.38  Tc(MIN.) =   16.25
      AREA-AVERAGED Fm(INCH/HR) = 0.30  AREA-AVERAGED Fp(INCH/HR) = 0.30
      AREA-AVERAGED Ap = 1.00  EFFECTIVE AREA(ACRES) =      274.28

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

```
    FLOW PROCESS FROM NODE  40450.00 TO NODE  40451.00 IS CODE =  51
--------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    398.00 DOWNSTREAM(FEET) =    386.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  401.00   CHANNEL SLOPE = 0.0299
    CHANNEL BASE(FEET) =    0.00  "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.603
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
     USER-DEFINED             -        71.80    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) =    373.48
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.30
    AVERAGE FLOW DEPTH(FEET) =  3.66    TRAVEL TIME(MIN.) =  0.72
    Tc(MIN.) =  16.97
    SUBAREA AREA(ACRES) =   71.80      SUBAREA RUNOFF(CFS) =   84.20
    EFFECTIVE AREA(ACRES) =   346.08     AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =     361.0        PEAK FLOW RATE(CFS) =    405.84

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 3.78   FLOW VELOCITY(FEET/SEC.) =  9.47
    LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40451.00 =   5498.00 FEET.

     ** PEAK FLOW RATE TABLE **
      STREAM       Q      Tc   Intensity   Fp(Fm)     Ap       Ae     HEADWATER
      NUMBER     (CFS)  (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)    NODE
         1       405.84  16.97   1.603   0.30( 0.30) 1.00     346.1   40430.00
         2       402.29  17.47   1.577   0.30( 0.30) 1.00     350.1   40440.00
         3       392.30  18.86   1.510   0.30( 0.30) 1.00     360.1   40400.00
         4       391.48  18.95   1.506   0.30( 0.30) 1.00     360.5   40420.00
         5       389.97  19.09   1.500   0.30( 0.30) 1.00     361.0   40410.00
      NEW PEAK FLOW DATA ARE:
      PEAK FLOW RATE(CFS) =    405.84  Tc(MIN.) =   16.97
      AREA-AVERAGED Fm(INCH/HR) = 0.30  AREA-AVERAGED Fp(INCH/HR) = 0.30
      AREA-AVERAGED Ap = 1.00  EFFECTIVE AREA(ACRES) =      346.08

***************************************************************************
    FLOW PROCESS FROM NODE  40451.00 TO NODE  40452.00 IS CODE =  51
--------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    386.00 DOWNSTREAM(FEET) =    358.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  957.00   CHANNEL SLOPE = 0.0293
    CHANNEL BASE(FEET) =    0.00  "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.535
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
     USER-DEFINED             -        12.07    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) =     412.55
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.70
   AVERAGE FLOW DEPTH(FEET) =  3.43    TRAVEL TIME(MIN.) =   1.36
   Tc(MIN.) =  18.33
   SUBAREA AREA(ACRES) =    12.07        SUBAREA RUNOFF(CFS) =   13.42
   EFFECTIVE AREA(ACRES) =    358.15      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     373.1       PEAK FLOW RATE(CFS) =     405.84
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  3.41    FLOW VELOCITY(FEET/SEC.) = 11.66
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40452.00 =    6455.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc     Intensity  Fp(Fm)     Ap      Ae      HEADWATER
   NUMBER    (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
     1      405.84   18.33    1.535    0.30( 0.30) 1.00     358.1   40430.00
     2      402.29   18.84    1.511    0.30( 0.30) 1.00     362.1   40440.00
     3      392.30   20.24    1.452    0.30( 0.30) 1.00     372.2   40400.00
     4      391.48   20.32    1.448    0.30( 0.30) 1.00     372.6   40420.00
     5      389.97   20.47    1.443    0.30( 0.30) 1.00     373.1   40410.00
   NEW PEAK FLOW DATA ARE:
   PEAK FLOW RATE(CFS) =     405.84  Tc(MIN.) =   18.33
   AREA-AVERAGED Fm(INCH/HR) =   0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =     358.15

***************************************************************************
   FLOW PROCESS FROM NODE  40452.00 TO NODE  40453.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =    341.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    429.00   CHANNEL SLOPE = 0.0396
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *   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              -        0.27     0.30      0.500      -
   USER-DEFINED              -        1.96     0.30      1.000      -
   USER-DEFINED              -        0.96     0.30      1.000      -
   USER-DEFINED              -        0.38     0.30      1.000      -
   USER-DEFINED              -        0.18     0.30      1.000      -
   USER-DEFINED              -        1.69     0.30      1.000      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.975
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     408.82
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 13.11
   AVERAGE FLOW DEPTH(FEET) =  3.22    TRAVEL TIME(MIN.) =   0.55
   Tc(MIN.) =  18.88
   SUBAREA AREA(ACRES) =     5.44        SUBAREA RUNOFF(CFS) =    5.96
   EFFECTIVE AREA(ACRES) =    363.59      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      378.5       PEAK FLOW RATE(CFS) =     405.84
```

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

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  3.22    FLOW VELOCITY(FEET/SEC.) = 13.07
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40453.00 =    6884.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc     Intensity  Fp(Fm)     Ap      Ae      HEADWATER
   NUMBER    (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
     1      405.84   18.88    1.510    0.30( 0.30) 1.00     363.6   40430.00
     2      402.29   19.39    1.487    0.30( 0.30) 1.00     367.6   40440.00
     3      392.30   20.79    1.430    0.30( 0.30) 1.00     377.6   40400.00
     4      391.48   20.87    1.427    0.30( 0.30) 1.00     378.0   40420.00
     5      389.97   21.02    1.421    0.30( 0.30) 1.00     378.5   40410.00
   NEW PEAK FLOW DATA ARE:
   PEAK FLOW RATE(CFS) =     405.84  Tc(MIN.) =   18.88
   AREA-AVERAGED Fm(INCH/HR) =   0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =     363.59

***************************************************************************
   FLOW PROCESS FROM NODE  40453.00 TO NODE  40453.00 IS CODE = 81
------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   MAINLINE Tc(MIN.) =   18.88
   *   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              -        0.18     0.30      1.000      -
   USER-DEFINED              -        5.30     0.30      0.850      -
   USER-DEFINED              -        0.64     0.30      1.000      -
   USER-DEFINED              -        2.08     0.30      1.000      -
   USER-DEFINED              -        0.67     0.30      0.100      -
   USER-DEFINED              -        0.29     0.30      1.000      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.847
   SUBAREA AREA(ACRES) =     9.16        SUBAREA RUNOFF(CFS) =   10.35
   EFFECTIVE AREA(ACRES) =    372.75     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      387.7       PEAK FLOW RATE(CFS) =     406.26

***************************************************************************
   FLOW PROCESS FROM NODE  40453.00 TO NODE  40450.00 IS CODE = 81
------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   MAINLINE Tc(MIN.) =   18.88
   *   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              -        0.03     0.30      1.000      -
   USER-DEFINED              -        4.59     0.30      0.850      -
   USER-DEFINED              -        0.01     0.30      1.000      -
   USER-DEFINED              -        0.51     0.30      1.000      -
   USER-DEFINED              -        0.73     0.30      1.000      -
   USER-DEFINED              -        0.16     0.30      1.000      -
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.886
 SUBAREA AREA(ACRES) =    6.03     SUBAREA RUNOFF(CFS) =    6.75
 EFFECTIVE AREA(ACRES) =    378.78   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.99
 TOTAL AREA(ACRES) =      393.7      PEAK FLOW RATE(CFS) =     413.01

******************************************************************************
 FLOW PROCESS FROM NODE  40453.00 TO NODE  40453.00 IS CODE =  81
------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
 MAINLINE Tc(MIN.) =   18.88
 *   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              -       0.37      0.30     1.000      -
 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) =    0.87     SUBAREA RUNOFF(CFS) =    0.95
 EFFECTIVE AREA(ACRES) =    379.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.99
 TOTAL AREA(ACRES) =      394.6      PEAK FLOW RATE(CFS) =     413.96
==============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      394.6  TC(MIN.) =     18.88
 EFFECTIVE AREA(ACRES) =    379.65 AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.994
 PEAK FLOW RATE(CFS)    =     413.96

 ** PEAK FLOW RATE TABLE **
  STREAM     Q      Tc    Intensity  Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
     1     413.96  18.88   1.510   0.30( 0.30) 0.99    379.6  40430.00
     2     410.60  19.39   1.487   0.30( 0.30) 0.99    383.6  40440.00
     3     401.04  20.79   1.430   0.30( 0.30) 0.99    393.7  40400.00
     4     400.27  20.87   1.427   0.30( 0.30) 0.99    394.1  40420.00
     5     398.79  21.02   1.421   0.30( 0.30) 0.99    394.6  40410.00
==============================================================================
==============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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 _____
 ************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
           (c) Copyright 1983-2013 Advanced Engineering Software (aes)
              Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                       Michael Baker International
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                         Santa Ana, CA92707


  *************************** DESCRIPTION OF STUDY **************************
 * RMV PA-4 WATERSHED 5 EXISTING CONDITION                                *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 10-YR EV MARCH 2019 CCHIU                                              *
  *************************************************************************

  FILE NAME: X40510EV.DAT
  TIME/DATE OF STUDY: 10:57 03/25/2019
 =========================================================================
  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   60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40500.00 TO NODE  40501.00 IS CODE =  21
 -------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   328.00
  ELEVATION DATA: UPSTREAM(FEET) =   961.00  DOWNSTREAM(FEET) =    845.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   8.819
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.315
  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
  "CHAPARRAL,BROADLEAF"      -        0.63     0.30     1.000    0   8.82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       1.14
  TOTAL AREA(ACRES) =        0.63   PEAK FLOW RATE(CFS) =       1.14

 *************************************************************************
  FLOW PROCESS FROM NODE  40501.00 TO NODE  40502.00 IS CODE =  51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   845.00  DOWNSTREAM(FEET) =    788.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  141.00   CHANNEL SLOPE = 0.4043
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.266
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap    SCS
        LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED               -        1.11     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) =    2.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.78
  AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   0.35
  Tc(MIN.) =   9.17
  SUBAREA AREA(ACRES) =    1.11       SUBAREA RUNOFF(CFS) =    1.97
  EFFECTIVE AREA(ACRES) =      1.74     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         1.7        PEAK FLOW RATE(CFS) =      3.08

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.37   FLOW VELOCITY(FEET/SEC.) =   7.46
  LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40502.00 =     469.00 FEET.

 *************************************************************************
  FLOW PROCESS FROM NODE  40502.00 TO NODE  40503.00 IS CODE =  51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   788.00  DOWNSTREAM(FEET) =    719.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  187.00   CHANNEL SLOPE = 0.3690
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.212
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        1.44     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) =      4.32
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.78
  AVERAGE FLOW DEPTH(FEET) =  0.43   TRAVEL TIME(MIN.) =  0.40
  Tc(MIN.) =   9.57
  SUBAREA AREA(ACRES) =     1.44      SUBAREA RUNOFF(CFS) =    2.48
  EFFECTIVE AREA(ACRES) =      3.18     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) =       5.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   FLOW VELOCITY(FEET/SEC.) = 8.32
  LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40503.00 =    656.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40503.00 TO NODE  40504.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   719.00  DOWNSTREAM(FEET) =    545.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   302.00   CHANNEL SLOPE = 0.5762
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  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             -         3.36     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) =      8.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.76
  AVERAGE FLOW DEPTH(FEET) =  0.51   TRAVEL TIME(MIN.) =  0.47
  Tc(MIN.) =  10.03
  SUBAREA AREA(ACRES) =     3.36      SUBAREA RUNOFF(CFS) =    5.61
  EFFECTIVE AREA(ACRES) =      6.54     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) =      10.91

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.56   FLOW VELOCITY(FEET/SEC.) = 11.60
  LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40504.00 =    958.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40504.00 TO NODE  40505.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   545.00  DOWNSTREAM(FEET) =    470.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   328.00   CHANNEL SLOPE = 0.2287
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
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*  5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.086
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -         9.58     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) =     18.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.42
  AVERAGE FLOW DEPTH(FEET) =  0.81   TRAVEL TIME(MIN.) =  0.58
  Tc(MIN.) =  10.61
  SUBAREA AREA(ACRES) =     9.58      SUBAREA RUNOFF(CFS) =   15.40
  EFFECTIVE AREA(ACRES) =     16.12     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        16.1       PEAK FLOW RATE(CFS) =      25.92

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.92   FLOW VELOCITY(FEET/SEC.) = 10.20
  LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40505.00 =   1286.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40505.00 TO NODE  40506.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   470.00  DOWNSTREAM(FEET) =    410.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   507.00   CHANNEL SLOPE = 0.1183
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.985
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP      (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -        10.98     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) =     34.25
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.56
  AVERAGE FLOW DEPTH(FEET) =  1.15   TRAVEL TIME(MIN.) =  0.99
  Tc(MIN.) =  11.60
  SUBAREA AREA(ACRES) =    10.98      SUBAREA RUNOFF(CFS) =   16.66
  EFFECTIVE AREA(ACRES) =     27.10     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        27.1       PEAK FLOW RATE(CFS) =      41.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.24   FLOW VELOCITY(FEET/SEC.) = 8.93
  LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40506.00 =   1793.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40506.00 TO NODE  40507.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   410.00  DOWNSTREAM(FEET) =    355.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   698.00   CHANNEL SLOPE = 0.0788
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 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.855
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp         Ap     SCS
        LAND USE           GROUP      (ACRES)   (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        4.53       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) =     44.27
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.86
 AVERAGE FLOW DEPTH(FEET) =  1.37   TRAVEL TIME(MIN.) =   1.48
 Tc(MIN.) =   13.08
 SUBAREA AREA(ACRES) =     4.53      SUBAREA RUNOFF(CFS) =    6.34
 EFFECTIVE AREA(ACRES) =     31.63     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      31.6        PEAK FLOW RATE(CFS) =     44.28

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.37   FLOW VELOCITY(FEET/SEC.) =   7.86
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40507.00 =   2491.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  40507.00 TO NODE  40518.00 IS CODE = 51
 ---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    341.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   604.00   CHANNEL SLOPE =  0.0232
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.740
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp         Ap     SCS
        LAND USE           GROUP      (ACRES)   (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        9.02       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) =     50.13
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.35
 AVERAGE FLOW DEPTH(FEET) =  1.62   TRAVEL TIME(MIN.) =   1.59
 Tc(MIN.) =   14.67
 SUBAREA AREA(ACRES) =     9.02      SUBAREA RUNOFF(CFS) =   11.69
 EFFECTIVE AREA(ACRES) =     40.66     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      40.7        PEAK FLOW RATE(CFS) =     52.69

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.65   FLOW VELOCITY(FEET/SEC.) =   6.43
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40518.00 =   3095.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  40518.00 TO NODE  40518.00 IS CODE =  1
 ---------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 ===========================================================================
 TOTAL NUMBER OF STREAMS =  2
```

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 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   14.67
 RAINFALL INTENSITY(INCH/HR) =   1.74
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      40.66
 TOTAL STREAM AREA(ACRES) =      40.66
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       52.69

*****************************************************************************
 FLOW PROCESS FROM NODE  40510.00 TO NODE  40511.00 IS CODE = 21
 ---------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ===========================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
 ELEVATION DATA: UPSTREAM(FEET) =    851.00  DOWNSTREAM(FEET) =    735.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.835
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.313
 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
 "CHAPARRAL,BROADLEAF"       -        0.48       0.30       1.000     0    8.84
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.86
 TOTAL AREA(ACRES) =       0.48   PEAK FLOW RATE(CFS) =       0.86

*****************************************************************************
 FLOW PROCESS FROM NODE  40511.00 TO NODE  40512.00 IS CODE = 51
 ---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    735.00  DOWNSTREAM(FEET) =    650.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   116.00   CHANNEL SLOPE =  0.7328
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.277
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp         Ap     SCS
        LAND USE           GROUP      (ACRES)   (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.73       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) =      1.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.76
 AVERAGE FLOW DEPTH(FEET) =  0.25   TRAVEL TIME(MIN.) =   0.25
 Tc(MIN.) =    9.08
 SUBAREA AREA(ACRES) =     0.73      SUBAREA RUNOFF(CFS) =    1.29
 EFFECTIVE AREA(ACRES) =      1.20     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       1.2        PEAK FLOW RATE(CFS) =       2.14
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       END OF SUBAREA CHANNEL FLOW HYDRAULICS:
       DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =  8.32
       LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40512.00 =    445.00 FEET.

   *************************************************************************
       FLOW PROCESS FROM NODE  40512.00 TO NODE  40513.00 IS CODE = 51
   -------------------------------------------------------------------------
       >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
       >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =========================================================================
       ELEVATION DATA: UPSTREAM(FEET) =   650.00  DOWNSTREAM(FEET) =    581.00
       CHANNEL LENGTH THRU SUBAREA(FEET) =  152.00   CHANNEL SLOPE = 0.4539
       CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
       MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
       *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.233
       SUBAREA LOSS RATE DATA(AMC II):
        DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
             LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
       USER-DEFINED              -        1.36      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) =      3.32
       TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.80
       AVERAGE FLOW DEPTH(FEET) =  0.38   TRAVEL TIME(MIN.) =  0.32
       Tc(MIN.) =   9.41
       SUBAREA AREA(ACRES) =    1.36      SUBAREA RUNOFF(CFS) =   2.36
       EFFECTIVE AREA(ACRES) =    2.56      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) =       4.45

       END OF SUBAREA CHANNEL FLOW HYDRAULICS:
       DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =  8.55
       LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40513.00 =    597.00 FEET.

   *************************************************************************
       FLOW PROCESS FROM NODE  40513.00 TO NODE  40514.00 IS CODE = 51
   -------------------------------------------------------------------------
       >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
       >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =========================================================================
       ELEVATION DATA: UPSTREAM(FEET) =   581.00  DOWNSTREAM(FEET) =    500.00
       CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE = 0.4629
       CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
       MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
       *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.192
       SUBAREA LOSS RATE DATA(AMC II):
        DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
             LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
       USER-DEFINED              -        2.32      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) =      6.43
       TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.38
       AVERAGE FLOW DEPTH(FEET) =  0.48   TRAVEL TIME(MIN.) =  0.31
       Tc(MIN.) =   9.72
       SUBAREA AREA(ACRES) =    2.32      SUBAREA RUNOFF(CFS) =   3.95
       EFFECTIVE AREA(ACRES) =    4.88      AREA-AVERAGED Fm(INCH/HR) =  0.30
       AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
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       TOTAL AREA(ACRES) =       4.9         PEAK FLOW RATE(CFS) =       8.31

       END OF SUBAREA CHANNEL FLOW HYDRAULICS:
       DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) = 10.10
       LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40514.00 =    772.00 FEET.

   *************************************************************************
       FLOW PROCESS FROM NODE  40514.00 TO NODE  40515.00 IS CODE = 51
   -------------------------------------------------------------------------
       >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
       >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =========================================================================
       ELEVATION DATA: UPSTREAM(FEET) =   500.00  DOWNSTREAM(FEET) =    440.00
       CHANNEL LENGTH THRU SUBAREA(FEET) =  206.00   CHANNEL SLOPE = 0.2913
       CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
       MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
       *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.145
       SUBAREA LOSS RATE DATA(AMC II):
        DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
             LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
       USER-DEFINED              -        2.15      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) =     10.09
       TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.89
       AVERAGE FLOW DEPTH(FEET) =  0.62   TRAVEL TIME(MIN.) =  0.39
       Tc(MIN.) =  10.11
       SUBAREA AREA(ACRES) =    2.15      SUBAREA RUNOFF(CFS) =   3.57
       EFFECTIVE AREA(ACRES) =    7.03      AREA-AVERAGED Fm(INCH/HR) =  0.30
       AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
       TOTAL AREA(ACRES) =       7.0         PEAK FLOW RATE(CFS) =      11.67

       END OF SUBAREA CHANNEL FLOW HYDRAULICS:
       DEPTH(FEET) =  0.65   FLOW VELOCITY(FEET/SEC.) =  9.17
       LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40515.00 =    978.00 FEET.

   *************************************************************************
       FLOW PROCESS FROM NODE  40515.00 TO NODE  40516.00 IS CODE = 51
   -------------------------------------------------------------------------
       >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
       >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =========================================================================
       ELEVATION DATA: UPSTREAM(FEET) =   440.00  DOWNSTREAM(FEET) =    390.00
       CHANNEL LENGTH THRU SUBAREA(FEET) =  269.00   CHANNEL SLOPE = 0.1859
       CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
       MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
       *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 2.083
       SUBAREA LOSS RATE DATA(AMC II):
        DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
             LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
       USER-DEFINED              -        5.24      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) =     15.88
       TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.35
       AVERAGE FLOW DEPTH(FEET) =  0.80   TRAVEL TIME(MIN.) =  0.54
       Tc(MIN.) =  10.64
       SUBAREA AREA(ACRES) =    5.24      SUBAREA RUNOFF(CFS) =   8.42
```

```
    EFFECTIVE AREA(ACRES) =     12.27    AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =      12.3        PEAK FLOW RATE(CFS) =     19.70

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.86   FLOW VELOCITY(FEET/SEC.) =   8.77
    LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40516.00 =   1247.00 FEET.

****************************************************************************
    FLOW PROCESS FROM NODE  40516.00 TO NODE  40517.00 IS CODE =  51
----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    390.00  DOWNSTREAM(FEET) =    355.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    384.00   CHANNEL SLOPE =  0.0911
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.989
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED             -        4.01      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) =     22.74
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.00
    AVERAGE FLOW DEPTH(FEET) =   1.04   TRAVEL TIME(MIN.) =   0.91
    Tc(MIN.) =  11.56
    SUBAREA AREA(ACRES) =    4.01       SUBAREA RUNOFF(CFS) =    6.10
    EFFECTIVE AREA(ACRES) =     16.28    AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =      16.3        PEAK FLOW RATE(CFS) =     24.75

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 1.07   FLOW VELOCITY(FEET/SEC.) =   7.17
    LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40517.00 =   1631.00 FEET.

****************************************************************************
    FLOW PROCESS FROM NODE  40517.00 TO NODE  40518.00 IS CODE =  51
----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    341.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    512.00   CHANNEL SLOPE =  0.0273
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
    *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.863
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED             -        8.89      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) =     31.01
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.98
    AVERAGE FLOW DEPTH(FEET) =   1.32   TRAVEL TIME(MIN.) =   1.43
```

```
    Tc(MIN.) =  12.99
    SUBAREA AREA(ACRES) =    8.89       SUBAREA RUNOFF(CFS) =   12.51
    EFFECTIVE AREA(ACRES) =     25.17    AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =      25.2        PEAK FLOW RATE(CFS) =     35.41

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 1.38   FLOW VELOCITY(FEET/SEC.) =   6.16
    LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40518.00 =   2143.00 FEET.

****************************************************************************
    FLOW PROCESS FROM NODE  40518.00 TO NODE  40518.00 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.) =  12.99
    RAINFALL INTENSITY(INCH/HR) =   1.86
    AREA-AVERAGED Fm(INCH/HR) = 0.30
    AREA-AVERAGED Fp(INCH/HR) = 0.30
    AREA-AVERAGED Ap = 1.00
    EFFECTIVE STREAM AREA(ACRES) =     25.17
    TOTAL STREAM AREA(ACRES) =      25.17
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      35.41

    ** CONFLUENCE DATA **
    STREAM     Q      Tc    Intensity  Fp(Fm)     Ap     Ae     HEADWATER
    NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
       1     52.69  14.67   1.740   0.30( 0.30) 1.00     40.7   40500.00
       2     35.41  12.99   1.863   0.30( 0.30) 1.00     25.2   40510.00

    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     86.05  12.99   1.863   0.30( 0.30) 1.00     61.2   40510.00
       2     85.30  14.67   1.740   0.30( 0.30) 1.00     65.8   40500.00

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      86.05    Tc(MIN.) =   12.99
    EFFECTIVE AREA(ACRES) =      61.17   AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =      65.8
    LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40518.00 =   3095.00 FEET.

****************************************************************************
    FLOW PROCESS FROM NODE  40518.00 TO NODE  40519.00 IS CODE =  51
----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    341.00  DOWNSTREAM(FEET) =    333.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    688.00   CHANNEL SLOPE =  0.0116
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
```

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MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
*  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.717
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
USER-DEFINED              -        3.34     0.30     1.000     -
USER-DEFINED              -        2.15     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) =      89.55
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.65
AVERAGE FLOW DEPTH(FEET) = 2.30   TRAVEL TIME(MIN.) =  2.03
Tc(MIN.) =  15.02
SUBAREA AREA(ACRES) =     5.49       SUBAREA RUNOFF(CFS) =    7.00
EFFECTIVE AREA(ACRES) =      66.66    AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =        71.3        PEAK FLOW RATE(CFS) =      86.05
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 2.26   FLOW VELOCITY(FEET/SEC.) =  5.60
LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40519.00 =   3783.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM      Q       Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      86.05   15.02   1.717    0.30( 0.30) 1.00     66.7   40510.00
    2      85.30   16.70   1.617    0.30( 0.30) 1.00     71.3   40500.00
NEW PEAK FLOW DATA ARE:
PEAK FLOW RATE(CFS) =       86.05  Tc(MIN.) =   15.02
AREA-AVERAGED Fm(INCH/HR) = 0.30  AREA-AVERAGED Fp(INCH/HR) = 0.30
AREA-AVERAGED Ap = 1.00  EFFECTIVE AREA(ACRES) =       66.66

*******************************************************************************
  FLOW PROCESS FROM NODE  40519.00 TO NODE  40519.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =   15.02
*  5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.717
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
USER-DEFINED              -        0.35     0.30     0.500     -
USER-DEFINED              -        4.48     0.30     1.000     -
USER-DEFINED              -        0.38     0.30     1.000     -
USER-DEFINED              -        1.49     0.30     1.000     -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.974
SUBAREA AREA(ACRES) =    6.70       SUBAREA RUNOFF(CFS) =    8.59
EFFECTIVE AREA(ACRES) =      73.36    AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =        78.0        PEAK FLOW RATE(CFS) =      93.60
===============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =       78.0  TC(MIN.) =     15.02
EFFECTIVE AREA(ACRES) =      73.36  AREA-AVERAGED Fm(INCH/HR)= 0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.998
```

```
PEAK FLOW RATE(CFS)   =        93.60

** PEAK FLOW RATE TABLE **
 STREAM      Q       Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      93.60   15.02   1.717    0.30( 0.30) 1.00     73.4   40510.00
    2      92.56   16.70   1.617    0.30( 0.30) 1.00     78.0   40500.00
===============================================================================
===============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
              (c) Copyright 1983-2013 Advanced Engineering Software (aes)
              Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                     Analysis prepared by:

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 *************************** DESCRIPTION OF STUDY ***************************
 * RMV PA-4 WATERSHED 6 EXISTING CONDITION                                 *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                   *
 * 10-YR EV MARCH 2019 CCHIU                                               *
 **************************************************************************

   FILE NAME: X40610EV.DAT
   TIME/DATE OF STUDY: 10:58 03/25/2019
 ============================================================================
   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   60.0    30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167  0.0150
  2   50.0    25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167  0.0150
  3   40.0    20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167  0.0150
  4   30.0    15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167  0.0150
  5   20.0    10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167  0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40600.00 TO NODE  40601.00 IS CODE =  21
 ----------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ============================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   279.00
   ELEVATION DATA: UPSTREAM(FEET) =  1054.00  DOWNSTREAM(FEET) =  1000.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.326
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.244
   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"              -         0.54     0.30     1.000    0   9.33
   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) =        0.54   PEAK FLOW RATE(CFS) =       0.95

 ****************************************************************************
   FLOW PROCESS FROM NODE  40601.00 TO NODE  40602.00 IS CODE =  51
 ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =  1000.00  DOWNSTREAM(FEET) =   985.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  199.00   CHANNEL SLOPE = 0.0754
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.121
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap    SCS
         LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         0.76     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) =     1.57
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.38
   AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   0.98
   Tc(MIN.) =   10.31
   SUBAREA AREA(ACRES) =      0.76       SUBAREA RUNOFF(CFS) =    1.24
   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) =       2.13

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =   3.59
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40602.00 =     478.00 FEET.

 ****************************************************************************
   FLOW PROCESS FROM NODE  40602.00 TO NODE  40603.00 IS CODE =  51
 ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   985.00  DOWNSTREAM(FEET) =   958.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  282.00   CHANNEL SLOPE = 0.0957
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  2.003
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED            -        1.11     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) =      2.99
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.26
 AVERAGE FLOW DEPTH(FEET) =  0.48   TRAVEL TIME(MIN.) =  1.10
 Tc(MIN.) =  11.41
 SUBAREA AREA(ACRES) =     1.11      SUBAREA RUNOFF(CFS) =    1.70
 EFFECTIVE AREA(ACRES) =      2.41     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       2.4        PEAK FLOW RATE(CFS) =      3.70

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.52   FLOW VELOCITY(FEET/SEC.) =  4.53
 LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40603.00 =    760.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40603.00 TO NODE  40604.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    958.00  DOWNSTREAM(FEET) =    940.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE = 0.0822
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.925
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED            -        0.36     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) =      3.96
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.33
 AVERAGE FLOW DEPTH(FEET) =  0.55   TRAVEL TIME(MIN.) =  0.84
 Tc(MIN.) =  12.25
 SUBAREA AREA(ACRES) =     0.36      SUBAREA RUNOFF(CFS) =    0.52
 EFFECTIVE AREA(ACRES) =      2.77     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       2.8        PEAK FLOW RATE(CFS) =      4.05

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.55   FLOW VELOCITY(FEET/SEC.) =  4.40
 LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40604.00 =    979.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40604.00 TO NODE  40605.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    940.00  DOWNSTREAM(FEET) =    800.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   547.00   CHANNEL SLOPE = 0.2559
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.824
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED            -        3.00     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) =      6.11
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.43
 AVERAGE FLOW DEPTH(FEET) =  0.52   TRAVEL TIME(MIN.) =  1.23
 Tc(MIN.) =  13.48
 SUBAREA AREA(ACRES) =     3.00      SUBAREA RUNOFF(CFS) =    4.11
 EFFECTIVE AREA(ACRES) =      5.77     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) =      7.91

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.58   FLOW VELOCITY(FEET/SEC.) =  7.92
 LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40605.00 =   1526.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40605.00 TO NODE  40606.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    680.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   277.00   CHANNEL SLOPE = 0.4332
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.790
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED            -        2.22     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) =      9.40
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.00
 AVERAGE FLOW DEPTH(FEET) =  0.56   TRAVEL TIME(MIN.) =  0.46
 Tc(MIN.) =  13.94
 SUBAREA AREA(ACRES) =     2.22      SUBAREA RUNOFF(CFS) =    2.98
 EFFECTIVE AREA(ACRES) =      7.99     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       8.0        PEAK FLOW RATE(CFS) =     10.72

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.58   FLOW VELOCITY(FEET/SEC.) =  10.45
 LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40606.00 =   1803.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40606.00 TO NODE  40607.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    680.00  DOWNSTREAM(FEET) =    670.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    59.00   CHANNEL SLOPE = 0.1695
```

```
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
*   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.781
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp        Ap       SCS
     LAND USE            GROUP     (ACRES)   (INCH/HR) (DECIMAL)   CN
 USER-DEFINED              -        9.34       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) =      16.94
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.22
 AVERAGE FLOW DEPTH(FEET) =  0.83   TRAVEL TIME(MIN.) =  0.12
 Tc(MIN.) =  14.06
 SUBAREA AREA(ACRES) =     9.34      SUBAREA RUNOFF(CFS) =  12.45
 EFFECTIVE AREA(ACRES) =   17.33     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      17.3       PEAK FLOW RATE(CFS) =     23.10

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.93   FLOW VELOCITY(FEET/SEC.) =  8.83
 LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40607.00 =   1862.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40607.00 TO NODE  40608.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    670.00  DOWNSTREAM(FEET) =    585.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   246.00   CHANNEL SLOPE = 0.3455
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.757
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp        Ap       SCS
      LAND USE           GROUP     (ACRES)   (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -        4.64       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) =      26.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 12.01
  AVERAGE FLOW DEPTH(FEET) =  0.85   TRAVEL TIME(MIN.) =  0.34
  Tc(MIN.) =  14.40
  SUBAREA AREA(ACRES) =     4.64      SUBAREA RUNOFF(CFS) =   6.08
  EFFECTIVE AREA(ACRES) =   21.96     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      22.0       PEAK FLOW RATE(CFS) =     28.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.89   FLOW VELOCITY(FEET/SEC.) = 12.18
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40608.00 =   2108.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40608.00 TO NODE  40609.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================

  ELEVATION DATA: UPSTREAM(FEET) =    585.00  DOWNSTREAM(FEET) =    494.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   482.00   CHANNEL SLOPE = 0.1888
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.706
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp        Ap       SCS
      LAND USE           GROUP     (ACRES)   (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -        8.61       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) =      34.26
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.21
  AVERAGE FLOW DEPTH(FEET) =  1.06   TRAVEL TIME(MIN.) =  0.79
  Tc(MIN.) =  15.19
  SUBAREA AREA(ACRES) =     8.61      SUBAREA RUNOFF(CFS) =  10.90
  EFFECTIVE AREA(ACRES) =   30.57     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      30.6       PEAK FLOW RATE(CFS) =     38.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.11   FLOW VELOCITY(FEET/SEC.) = 10.48
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40609.00 =   2590.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40609.00 TO NODE  40610.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    494.00  DOWNSTREAM(FEET) =    470.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   236.00   CHANNEL SLOPE = 0.1017
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.678
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp        Ap       SCS
      LAND USE           GROUP     (ACRES)   (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -       18.33       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) =      50.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.88
  AVERAGE FLOW DEPTH(FEET) =  1.37   TRAVEL TIME(MIN.) =  0.44
  Tc(MIN.) =  15.63
  SUBAREA AREA(ACRES) =    18.33      SUBAREA RUNOFF(CFS) =  22.74
  EFFECTIVE AREA(ACRES) =   48.90     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      48.9       PEAK FLOW RATE(CFS) =     60.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.48   FLOW VELOCITY(FEET/SEC.) =  9.29
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40610.00 =   2826.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40610.00 TO NODE  40611.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    425.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   560.00   CHANNEL SLOPE = 0.0804
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.617
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -         10.11     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) =      66.66
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.77
   AVERAGE FLOW DEPTH(FEET) =  1.59   TRAVEL TIME(MIN.) =   1.06
   Tc(MIN.) =  16.70
   SUBAREA AREA(ACRES) =   10.11        SUBAREA RUNOFF(CFS) =   11.99
   EFFECTIVE AREA(ACRES) =    59.01     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      59.0        PEAK FLOW RATE(CFS) =      69.97

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.62   FLOW VELOCITY(FEET/SEC.) =  8.86
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40611.00 =   3386.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40611.00 TO NODE  40612.00 IS CODE = 51
---------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    425.00  DOWNSTREAM(FEET) =    373.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   906.00   CHANNEL SLOPE = 0.0574
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.524
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -         20.87     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) =      81.48
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.13
   AVERAGE FLOW DEPTH(FEET) =  1.83   TRAVEL TIME(MIN.) =   1.86
   Tc(MIN.) =  18.56
   SUBAREA AREA(ACRES) =   20.87        SUBAREA RUNOFF(CFS) =   23.00
   EFFECTIVE AREA(ACRES) =    79.89     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      79.9        PEAK FLOW RATE(CFS) =      88.03

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.89   FLOW VELOCITY(FEET/SEC.) =  8.24
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40612.00 =   4292.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40612.00 TO NODE  40613.00 IS CODE = 51
```

```
---------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    373.00  DOWNSTREAM(FEET) =    328.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1192.00   CHANNEL SLOPE = 0.0378
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.429
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -          0.04     0.30     1.000      -
   USER-DEFINED              -          0.14     0.30     1.000      -
   USER-DEFINED              -          0.96     0.30     1.000      -
   USER-DEFINED              -          0.21     0.30     1.000      -
   USER-DEFINED              -          0.71     0.30     1.000      -
   USER-DEFINED              -          3.41     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) =      90.81
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.83
   AVERAGE FLOW DEPTH(FEET) =  1.85   TRAVEL TIME(MIN.) =   2.25
   Tc(MIN.) =  20.81
   SUBAREA AREA(ACRES) =    5.47        SUBAREA RUNOFF(CFS) =    5.56
   EFFECTIVE AREA(ACRES) =    85.36     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      85.4        PEAK FLOW RATE(CFS) =      88.03
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.83   FLOW VELOCITY(FEET/SEC.) =  8.78
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40613.00 =   5484.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40613.00 TO NODE  40613.00 IS CODE = 81
---------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===================================================================
   MAINLINE Tc(MIN.) =  20.81
   *   5 YEAR RAINFALL INTENSITY(INCH/HR) = 1.429
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -          0.07     0.30     1.000      -
   USER-DEFINED              -          0.69     0.30     1.000      -
   USER-DEFINED              -          0.99     0.30     1.000      -
   USER-DEFINED              -          4.13     0.30     1.000      -
   USER-DEFINED              -          0.72     0.30     1.000      -
   USER-DEFINED              -          0.26     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) =    6.86        SUBAREA RUNOFF(CFS) =    6.97
   EFFECTIVE AREA(ACRES) =    92.22   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      92.2        PEAK FLOW RATE(CFS) =      93.74

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

```
 FLOW PROCESS FROM NODE  40613.00 TO NODE  40613.00 IS CODE =  81
------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
 MAINLINE Tc(MIN.) =   20.81
 *   5 YEAR RAINFALL INTENSITY(INCH/HR) =  1.429
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp        Ap       SCS
      LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED               -        6.92      0.30      1.000      -
 USER-DEFINED               -        2.35      0.30      1.000      -
 USER-DEFINED               -        0.47      0.30      1.000      -
 USER-DEFINED               -        3.66      0.30      1.000      -
 USER-DEFINED               -        0.31      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) =   13.71      SUBAREA RUNOFF(CFS) =   13.94
 EFFECTIVE AREA(ACRES) =    105.93  AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =     105.9      PEAK FLOW RATE(CFS) =     107.68
==============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      105.9  TC(MIN.) =     20.81
 EFFECTIVE AREA(ACRES) =    105.93  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)   =      107.68
==============================================================================
==============================================================================
 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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            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

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                        Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 3 EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 25-YR EV MARCH 2019 CCHIU                                             *
 **************************************************************************

   FILE NAME: X30325EV.DAT
   TIME/DATE OF STUDY: 10:23 03/25/2019
===========================================================================
   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  60.0    30.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  30300.00 TO NODE  30301.00 IS CODE =  21
---------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
   ELEVATION DATA: UPSTREAM(FEET) =    622.00  DOWNSTREAM(FEET) =    551.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.676
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.781
   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
   "CHAPARRAL,NARROWLEAF"    -        1.80     0.30     1.000    0   9.68
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      4.02
   TOTAL AREA(ACRES) =       1.80   PEAK FLOW RATE(CFS) =      4.02

****************************************************************************
   FLOW PROCESS FROM NODE  30301.00 TO NODE  30302.00 IS CODE =  51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    551.00  DOWNSTREAM(FEET) =    508.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 2187.00   CHANNEL SLOPE = 0.0197
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.763
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS
        LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
   USER-DEFINED              -        6.70     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) =     8.55
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.10
   AVERAGE FLOW DEPTH(FEET) =   0.96   TRAVEL TIME(MIN.) = 11.75
   Tc(MIN.) =   21.43
   SUBAREA AREA(ACRES) =     6.70       SUBAREA RUNOFF(CFS) =     8.83
   EFFECTIVE AREA(ACRES) =      8.50    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        8.5        PEAK FLOW RATE(CFS) =      11.20

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.06   FLOW VELOCITY(FEET/SEC.) =   3.30
   LONGEST FLOWPATH FROM NODE  30300.00 TO NODE  30302.00 =    2512.00 FEET.
===========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =        8.5  TC(MIN.) =    21.43
   EFFECTIVE AREA(ACRES) =        8.50  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)   =       11.20
===========================================================================
===========================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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

                       Michael Baker International
                     5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
* RMV PA-3 WATERSHED 4A EXISTING CONDITION                             *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
* 25-YR EV MARCH 2019 CCHIU                                           *
  *********************************************************************

  FILE NAME: X34A25EV.DAT
  TIME/DATE OF STUDY: 10:16 03/25/2019
================================================================
  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  60.0    30.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30400.00 TO NODE  30401.00 IS CODE =  21
-----------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
  ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    580.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.150
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.068
  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.)
  AGRICULTURAL POOR COVER
  "ROW CROPS,STRAIGHT ROW"   -        0.26     0.30     1.000    0   8.15
  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) =        0.26   PEAK FLOW RATE(CFS) =        0.64

*****************************************************************************
  FLOW PROCESS FROM NODE  30401.00 TO NODE  30402.00 IS CODE =  51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    580.00  DOWNSTREAM(FEET) =    540.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  220.00   CHANNEL SLOPE = 0.1818
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.896
  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
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     1.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    4.24
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   0.87
  Tc(MIN.) =   9.02
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =     0.93
  EFFECTIVE AREA(ACRES) =        0.65     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =          0.7        PEAK FLOW RATE(CFS) =       1.53

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   FLOW VELOCITY(FEET/SEC.) =   4.64
  LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30402.00 =     536.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30402.00 TO NODE  30403.00 IS CODE =  51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    491.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  151.00   CHANNEL SLOPE = 0.3245
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.829
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/        SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        0.12      0.30      1.000     -
 USER-DEFINED               -        0.86      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) =      2.64
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.67
 AVERAGE FLOW DEPTH(FEET) =  0.36   TRAVEL TIME(MIN.) =   0.38
 Tc(MIN.) =   9.39
 SUBAREA AREA(ACRES) =    0.98      SUBAREA RUNOFF(CFS) =    2.23
 EFFECTIVE AREA(ACRES) =     1.63    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        1.6      PEAK FLOW RATE(CFS) =      3.72

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   FLOW VELOCITY(FEET/SEC.) = 7.20
 LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30403.00 =     687.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30403.00 TO NODE  30404.00 IS CODE = 51
-----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    491.00  DOWNSTREAM(FEET) =    473.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE = 0.1059
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.739
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        1.00      0.30      1.000     -
 USER-DEFINED               -        1.00      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) =      5.91
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.24
 AVERAGE FLOW DEPTH(FEET) =  0.61   TRAVEL TIME(MIN.) =   0.54
 Tc(MIN.) =   9.93
 SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    4.39
 EFFECTIVE AREA(ACRES) =     3.63    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) =      7.98

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.68   FLOW VELOCITY(FEET/SEC.) = 5.69
 LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30404.00 =     857.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30404.00 TO NODE  30405.00 IS CODE = 51
-----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    473.00  DOWNSTREAM(FEET) =    430.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   289.00   CHANNEL SLOPE = 0.1488
```

```
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.658
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -       20.80      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) =     30.06
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.99
 AVERAGE FLOW DEPTH(FEET) =  1.06   TRAVEL TIME(MIN.) =   0.54
 Tc(MIN.) =  10.47
 SUBAREA AREA(ACRES) =   20.80      SUBAREA RUNOFF(CFS) =   44.14
 EFFECTIVE AREA(ACRES) =    24.43    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       24.4      PEAK FLOW RATE(CFS) =     51.85

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.29   FLOW VELOCITY(FEET/SEC.) = 10.35
 LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30405.00 =    1146.00 FEET.
=============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)       =       24.4  TC(MIN.) =      10.47
 EFFECTIVE AREA(ACRES)   =      24.43  AREA-AVERAGED Fm(INCH/HR)= 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)     =      51.85
=============================================================================

=============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

                    Michael Baker International
                  5 Hutton Centre Drive Suite 500
                       Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 4B EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 25-YR EV MARCH 2019 CCHIU                                           *
  *********************************************************************

  FILE NAME: X34B25EV.DAT
  TIME/DATE OF STUDY: 10:17 03/25/2019
==========================================================================
  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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
 2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
 3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
 4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
 5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30410.00 TO NODE  30411.00 IS CODE = 21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
  ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    558.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.546
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.207
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap     SCS    Tc
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN   (MIN.)
  AGRICULTURAL POOR COVER
  "ROW CROPS,STRAIGHT ROW"  -        0.59     0.30     1.000    0    7.55
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.55
  TOTAL AREA(ACRES) =       0.59    PEAK FLOW RATE(CFS) =        1.55

**************************************************************************
  FLOW PROCESS FROM NODE  30411.00 TO NODE  30412.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    558.00  DOWNSTREAM(FEET) =    534.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  137.00   CHANNEL SLOPE = 0.1752
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.104
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap     SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED             -        0.85     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) =      2.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.20
  AVERAGE FLOW DEPTH(FEET) =   0.41    TRAVEL TIME(MIN.) =    0.44
  Tc(MIN.) =    7.98
  SUBAREA AREA(ACRES) =      0.85      SUBAREA RUNOFF(CFS) =    2.13
  EFFECTIVE AREA(ACRES) =       1.44     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       3.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.46   FLOW VELOCITY(FEET/SEC.) =   5.65
  LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30412.00 =     464.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  30412.00 TO NODE  30413.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    534.00  DOWNSTREAM(FEET) =    504.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  204.00   CHANNEL SLOPE = 0.1471
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.983
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp        Ap      SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        1.59      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) =      5.54
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.89
   AVERAGE FLOW DEPTH(FEET) =  0.56   TRAVEL TIME(MIN.) =   0.58
   Tc(MIN.) =   8.56
   SUBAREA AREA(ACRES) =     1.59       SUBAREA RUNOFF(CFS) =    3.83
   EFFECTIVE AREA(ACRES) =      3.02    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) =       7.30

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.62   FLOW VELOCITY(FEET/SEC.) =  6.31
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30413.00 =    668.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30413.00 TO NODE  30414.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    504.00  DOWNSTREAM(FEET) =     472.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE = 0.1296
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.868
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp        Ap      SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        3.99      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) =     11.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.77
   AVERAGE FLOW DEPTH(FEET) =  0.77   TRAVEL TIME(MIN.) =   0.61
   Tc(MIN.) =   9.17
   SUBAREA AREA(ACRES) =     3.99       SUBAREA RUNOFF(CFS) =    9.22
   EFFECTIVE AREA(ACRES) =      7.01    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        7.0        PEAK FLOW RATE(CFS) =      16.21

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.86   FLOW VELOCITY(FEET/SEC.) =  7.35
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30414.00 =    915.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30414.00 TO NODE  30415.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    472.00  DOWNSTREAM(FEET) =     447.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   345.00   CHANNEL SLOPE = 0.0725
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.719
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp        Ap      SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        6.31      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) =      23.08
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.43
   AVERAGE FLOW DEPTH(FEET) =  1.09   TRAVEL TIME(MIN.) =   0.89
   Tc(MIN.) =  10.06
   SUBAREA AREA(ACRES) =     6.31       SUBAREA RUNOFF(CFS) =   13.74
   EFFECTIVE AREA(ACRES) =     13.32    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       13.3        PEAK FLOW RATE(CFS) =      29.00

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.19   FLOW VELOCITY(FEET/SEC.) =  6.86
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30415.00 =   1260.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30415.00 TO NODE  30416.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =     403.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   781.00   CHANNEL SLOPE = 0.0563
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 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
   USER-DEFINED               -       11.95      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) =      40.63
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.75
   AVERAGE FLOW DEPTH(FEET) =  1.42   TRAVEL TIME(MIN.) =   1.93
   Tc(MIN.) =  11.99
   SUBAREA AREA(ACRES) =    11.95       SUBAREA RUNOFF(CFS) =   23.22
   EFFECTIVE AREA(ACRES) =     25.27    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       25.3        PEAK FLOW RATE(CFS) =      49.11

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.52   FLOW VELOCITY(FEET/SEC.) =  7.08
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30416.00 =   2041.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30416.00 TO NODE  30417.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    403.00  DOWNSTREAM(FEET) =     387.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   383.00   CHANNEL SLOPE = 0.0418
```

```
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.353
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE         GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -         2.70      0.30       1.000     -
 USER-DEFINED              -         2.80      0.30       1.000     -
 USER-DEFINED              -         2.90      0.30       1.000     -
 USER-DEFINED              -         0.90      0.30       1.000     -
 USER-DEFINED              -         0.10      0.30       1.000     -
 USER-DEFINED              -         3.20      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) =     60.75
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.67
 AVERAGE FLOW DEPTH(FEET) =  1.74   TRAVEL TIME(MIN.) =   0.96
 Tc(MIN.) =  12.95
 SUBAREA AREA(ACRES) =    12.60       SUBAREA RUNOFF(CFS) =   23.29
 EFFECTIVE AREA(ACRES) =     37.87    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       37.9       PEAK FLOW RATE(CFS) =      69.99

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.84   FLOW VELOCITY(FEET/SEC.) =   6.92
 LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30417.00 =   2424.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  30417.00 TO NODE  30417.00 IS CODE = 81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =  12.95
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.353
  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              -         0.10      0.30       1.000     -
 USER-DEFINED              -         0.70      0.30       1.000     -
 USER-DEFINED              -         0.20      0.30       1.000     -
 USER-DEFINED              -         0.90      0.30       1.000     -
 USER-DEFINED              -         0.10      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) =     2.60       SUBAREA RUNOFF(CFS) =    4.80
 EFFECTIVE AREA(ACRES) =     40.47    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       40.5       PEAK FLOW RATE(CFS) =      74.79

*******************************************************************************
  FLOW PROCESS FROM NODE  30417.00 TO NODE  30417.00 IS CODE = 81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =  12.95
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.353
  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              -         0.30      0.30       1.000     -
 USER-DEFINED              -         0.10      0.30       1.000     -
 USER-DEFINED              -         0.10      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) =     1.50       SUBAREA RUNOFF(CFS) =    2.77
 EFFECTIVE AREA(ACRES) =     41.97    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       42.0       PEAK FLOW RATE(CFS) =      77.57
===============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        42.0  TC(MIN.) =     12.95
 EFFECTIVE AREA(ACRES) =     41.97 AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.000
 PEAK FLOW RATE(CFS)   =        77.57
===============================================================================

===============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
_____
****************************************************************************
       RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
        (c) Copyright 1983-2013 Advanced Engineering Software (aes)
          Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

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                        Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 5A EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 25-YR EV MARCH 2019 CCHIU                                             *
 *************************************************************************

  FILE NAME: X35A25EV.DAT
  TIME/DATE OF STUDY: 10:17 03/25/2019
==========================================================================
  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  60.0    30.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30500.00 TO NODE  30501.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    303.00
  ELEVATION DATA: UPSTREAM(FEET) =    769.00  DOWNSTREAM(FEET) =     695.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.201
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.862
  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"             -         1.01     0.30      1.000    0   9.20
  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) =       1.01   PEAK FLOW RATE(CFS) =       2.32

****************************************************************************
  FLOW PROCESS FROM NODE  30501.00 TO NODE  30502.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    695.00  DOWNSTREAM(FEET) =    665.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   167.00   CHANNEL SLOPE = 0.1796
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.777
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap    SCS
        LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         0.89     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) =      3.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.56
  AVERAGE FLOW DEPTH(FEET) =   0.45    TRAVEL TIME(MIN.) =   0.50
  Tc(MIN.) =   9.70
  SUBAREA AREA(ACRES) =      0.89       SUBAREA RUNOFF(CFS) =    1.98
  EFFECTIVE AREA(ACRES) =       1.89      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =          1.9         PEAK FLOW RATE(CFS) =       4.22

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   FLOW VELOCITY(FEET/SEC.) =   5.97
  LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30502.00 =     470.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30502.00 TO NODE  30503.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    665.00  DOWNSTREAM(FEET) =    645.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE = 0.1818
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.730
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
        DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
           LAND USE             GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
      USER-DEFINED                 -        0.98     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) =       5.29
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.30
      AVERAGE FLOW DEPTH(FEET) =  0.53   TRAVEL TIME(MIN.) =   0.29
      Tc(MIN.) =  9.99
      SUBAREA AREA(ACRES) =      0.98      SUBAREA RUNOFF(CFS) =    2.15
      EFFECTIVE AREA(ACRES) =       2.88    AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
      TOTAL AREA(ACRES) =        2.9       PEAK FLOW RATE(CFS) =       6.29

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) = 0.56   FLOW VELOCITY(FEET/SEC.) =  6.64
      LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30503.00 =    580.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  30503.00 TO NODE  30504.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    630.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   152.00   CHANNEL SLOPE = 0.0987
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.665
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
          LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED                -        3.30     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) =       9.80
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.89
   AVERAGE FLOW DEPTH(FEET) =  0.74   TRAVEL TIME(MIN.) =   0.43
   Tc(MIN.) =  10.42
   SUBAREA AREA(ACRES) =      3.30      SUBAREA RUNOFF(CFS) =    7.03
   EFFECTIVE AREA(ACRES) =       6.18    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        6.2       PEAK FLOW RATE(CFS) =      13.15

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.83   FLOW VELOCITY(FEET/SEC.) =  6.29
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30504.00 =    732.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  30504.00 TO NODE  30505.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    600.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   329.00   CHANNEL SLOPE = 0.0912
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.554
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
          LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED                -        7.11     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) =      20.36
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.83
   AVERAGE FLOW DEPTH(FEET) =  1.00   TRAVEL TIME(MIN.) =   0.80
   Tc(MIN.) =  11.22
   SUBAREA AREA(ACRES) =      7.11      SUBAREA RUNOFF(CFS) =   14.42
   EFFECTIVE AREA(ACRES) =      13.28    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      26.95

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.11   FLOW VELOCITY(FEET/SEC.) =  7.30
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30505.00 =   1061.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  30505.00 TO NODE  30506.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    585.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   297.00   CHANNEL SLOPE = 0.0505
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 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
   USER-DEFINED                -       10.71     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) =      37.35
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.36
   AVERAGE FLOW DEPTH(FEET) =  1.40   TRAVEL TIME(MIN.) =   0.78
   Tc(MIN.) =  12.00
   SUBAREA AREA(ACRES) =     10.71      SUBAREA RUNOFF(CFS) =   20.80
   EFFECTIVE AREA(ACRES) =      24.00    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       24.0       PEAK FLOW RATE(CFS) =      46.60

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.52   FLOW VELOCITY(FEET/SEC.) =  6.71
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30506.00 =   1358.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  30506.00 TO NODE  30507.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    585.00  DOWNSTREAM(FEET) =    550.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   700.00   CHANNEL SLOPE = 0.0500
```

```
    CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.284
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp        Ap     SCS
          LAND USE           GROUP     (ACRES)   (INCH/HR) (DECIMAL)   CN
    USER-DEFINED               -        15.01      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) =     60.01
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.12
    AVERAGE FLOW DEPTH(FEET) =  1.68    TRAVEL TIME(MIN.) =  1.64
    Tc(MIN.) =   13.64
    SUBAREA AREA(ACRES) =    15.01       SUBAREA RUNOFF(CFS) =   26.80
    EFFECTIVE AREA(ACRES) =     39.01      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =      39.0        PEAK FLOW RATE(CFS) =     69.65

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.77   FLOW VELOCITY(FEET/SEC.) =  7.39
    LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30507.00 =   2058.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30507.00 TO NODE  30508.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    550.00  DOWNSTREAM(FEET) =    500.00
    CHANNEL LENGTH THRU SUBAREA(FEET) = 1107.00   CHANNEL SLOPE = 0.0452
    CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.083
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp        Ap     SCS
          LAND USE           GROUP     (ACRES)   (INCH/HR) (DECIMAL)   CN
    USER-DEFINED               -        34.74      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) =     97.55
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.74
    AVERAGE FLOW DEPTH(FEET) =  2.05    TRAVEL TIME(MIN.) =  2.38
    Tc(MIN.) =   16.02
    SUBAREA AREA(ACRES) =    34.74       SUBAREA RUNOFF(CFS) =   55.74
    EFFECTIVE AREA(ACRES) =     73.74      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =      73.7        PEAK FLOW RATE(CFS) =    118.33

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  2.20   FLOW VELOCITY(FEET/SEC.) =  8.13
    LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30508.00 =   3165.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30508.00 TO NODE  30518.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
```

```
    ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    465.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  982.00   CHANNEL SLOPE = 0.0356
    CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.937
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp        Ap     SCS
          LAND USE           GROUP     (ACRES)   (INCH/HR) (DECIMAL)   CN
    USER-DEFINED               -        11.69      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) =    126.94
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.58
    AVERAGE FLOW DEPTH(FEET) =  2.36    TRAVEL TIME(MIN.) =  2.16
    Tc(MIN.) =   18.18
    SUBAREA AREA(ACRES) =    11.69       SUBAREA RUNOFF(CFS) =   17.23
    EFFECTIVE AREA(ACRES) =     85.43      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =      85.4        PEAK FLOW RATE(CFS) =    125.90

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  2.35   FLOW VELOCITY(FEET/SEC.) =  7.57
    LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30518.00 =   4147.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30518.00 TO NODE  30518.00 IS CODE =  1
--------------------------------------------------------------------------
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
    TOTAL NUMBER OF STREAMS = 2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
    TIME OF CONCENTRATION(MIN.) =   18.18
    RAINFALL INTENSITY(INCH/HR) =   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) =      85.43
    TOTAL STREAM AREA(ACRES) =      85.43
    PEAK FLOW RATE(CFS) AT CONFLUENCE =    125.90

****************************************************************************
   FLOW PROCESS FROM NODE  30510.00 TO NODE  30511.00 IS CODE = 21
--------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
    INITIAL SUBAREA FLOW-LENGTH(FEET) =  315.00
    ELEVATION DATA: UPSTREAM(FEET) =    792.00  DOWNSTREAM(FEET) =    690.00

    Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
    SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.832
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.930
    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
    "CHAPARRAL,NARROWLEAF"     -         1.17      0.30     1.000     0   8.83
    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) =      2.78
   TOTAL AREA(ACRES) =      1.17   PEAK FLOW RATE(CFS) =      2.78


**************************************************************************
   FLOW PROCESS FROM NODE  30511.00 TO NODE  30512.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    690.00  DOWNSTREAM(FEET) =     650.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   182.00   CHANNEL SLOPE = 0.2198
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 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             -          2.22     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) =       5.33
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.72
   AVERAGE FLOW DEPTH(FEET) =   0.51   TRAVEL TIME(MIN.) =   0.45
   Tc(MIN.) =   9.28
   SUBAREA AREA(ACRES) =    2.22       SUBAREA RUNOFF(CFS) =    5.09
   EFFECTIVE AREA(ACRES) =     3.39      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       3.4        PEAK FLOW RATE(CFS) =       7.78

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.59   FLOW VELOCITY(FEET/SEC.) =   7.45
   LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30512.00 =     497.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  30512.00 TO NODE  30513.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =     610.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   352.00   CHANNEL SLOPE = 0.1136
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.693
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -          2.07     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) =      10.01
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.17
   AVERAGE FLOW DEPTH(FEET) =   0.74   TRAVEL TIME(MIN.) =   0.95
   Tc(MIN.) =   10.23
   SUBAREA AREA(ACRES) =    2.07       SUBAREA RUNOFF(CFS) =    4.45
   EFFECTIVE AREA(ACRES) =     5.46      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
```

```
   TOTAL AREA(ACRES) =        5.5        PEAK FLOW RATE(CFS) =       11.77

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.78   FLOW VELOCITY(FEET/SEC.) =   6.43
   LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30513.00 =     849.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30513.00 TO NODE  30514.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =     605.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    49.00   CHANNEL SLOPE = 0.1020
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.675
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -          6.01     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) =      18.19
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.93
   AVERAGE FLOW DEPTH(FEET) =   0.94   TRAVEL TIME(MIN.) =   0.12
   Tc(MIN.) =   10.35
   SUBAREA AREA(ACRES) =    6.01       SUBAREA RUNOFF(CFS) =   12.85
   EFFECTIVE AREA(ACRES) =    11.47      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       11.5        PEAK FLOW RATE(CFS) =       24.53

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.05   FLOW VELOCITY(FEET/SEC.) =   7.44
   LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30514.00 =     898.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30514.00 TO NODE  30515.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =     600.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    29.00   CHANNEL SLOPE = 0.1724
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.668
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -          4.23     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) =      29.04
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.46
   AVERAGE FLOW DEPTH(FEET) =   1.01   TRAVEL TIME(MIN.) =   0.05
   Tc(MIN.) =   10.40
   SUBAREA AREA(ACRES) =    4.23       SUBAREA RUNOFF(CFS) =    9.02
```

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EFFECTIVE AREA(ACRES) =     15.71      AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =       15.7        PEAK FLOW RATE(CFS) =      33.47

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.07   FLOW VELOCITY(FEET/SEC.) =  9.83
LONGEST FLOWPATH FROM NODE 30510.00 TO NODE 30515.00 =    927.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE 30515.00 TO NODE 30516.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    574.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   444.00   CHANNEL SLOPE = 0.0586
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.520
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
       LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -        6.53      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) =      40.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.81
  AVERAGE FLOW DEPTH(FEET) =  1.40   TRAVEL TIME(MIN.) =   1.09
  Tc(MIN.) =  11.49
  SUBAREA AREA(ACRES) =    6.53       SUBAREA RUNOFF(CFS) =   13.04
  EFFECTIVE AREA(ACRES) =     22.23      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       22.2        PEAK FLOW RATE(CFS) =      44.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.45   FLOW VELOCITY(FEET/SEC.) =  7.02
  LONGEST FLOWPATH FROM NODE 30510.00 TO NODE 30516.00 =   1371.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE 30516.00 TO NODE 30517.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =    519.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1042.00   CHANNEL SLOPE = 0.0528
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.257
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
       LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -       12.01      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) =      55.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.12
  AVERAGE FLOW DEPTH(FEET) =  1.61   TRAVEL TIME(MIN.) =   2.44
```

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  Tc(MIN.) =  13.93
  SUBAREA AREA(ACRES) =    12.01       SUBAREA RUNOFF(CFS) =   21.15
  EFFECTIVE AREA(ACRES) =     34.24      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       34.2        PEAK FLOW RATE(CFS) =      60.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.66   FLOW VELOCITY(FEET/SEC.) =  7.29
  LONGEST FLOWPATH FROM NODE 30510.00 TO NODE 30517.00 =   2413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE 30517.00 TO NODE 30518.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    519.00  DOWNSTREAM(FEET) =    465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1223.00   CHANNEL SLOPE = 0.0442
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.032
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
       LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -       22.15      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) =      77.58
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.26
  AVERAGE FLOW DEPTH(FEET) =  1.89   TRAVEL TIME(MIN.) =   2.81
  Tc(MIN.) =  16.74
  SUBAREA AREA(ACRES) =    22.15       SUBAREA RUNOFF(CFS) =   34.52
  EFFECTIVE AREA(ACRES) =     56.39      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       56.4        PEAK FLOW RATE(CFS) =      87.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.98   FLOW VELOCITY(FEET/SEC.) =  7.48
  LONGEST FLOWPATH FROM NODE 30510.00 TO NODE 30518.00 =   3636.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE 30518.00 TO NODE 30518.00 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.) =  16.74
  RAINFALL INTENSITY(INCH/HR) =  2.03
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      56.39
  TOTAL STREAM AREA(ACRES) =      56.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      87.88

  ** CONFLUENCE DATA **
```

```
   STREAM      Q      Tc   Intensity  Fp(Fm)    Ap     Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)   NODE
      1      125.90  18.18   1.937  0.30( 0.30) 1.00    85.4   30500.00
      2       87.88  16.74   2.032  0.30( 0.30) 1.00    56.4   30510.00

   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      210.44  16.74   2.032  0.30( 0.30) 1.00   135.0   30510.00
      2      209.00  18.18   1.937  0.30( 0.30) 1.00   141.8   30500.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     210.44   Tc(MIN.) =    16.74
   EFFECTIVE AREA(ACRES) =     135.03   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =     141.8
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30518.00 =   4147.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30518.00 TO NODE  30519.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =    448.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    451.00   CHANNEL SLOPE = 0.0377
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.975
   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             -       0.50      0.30     1.000      -
   USER-DEFINED             -       2.40      0.30     0.000      -
   USER-DEFINED             -       2.70      0.30     1.000      -
   USER-DEFINED             -       0.10      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 = 0.671
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    216.26
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.84
   AVERAGE FLOW DEPTH(FEET) =   2.86    TRAVEL TIME(MIN.) =   0.85
   Tc(MIN.) =   17.59
   SUBAREA AREA(ACRES) =     7.30       SUBAREA RUNOFF(CFS) =   11.65
   EFFECTIVE AREA(ACRES) =    142.33      AREA-AVERAGED Fm(INCH/HR) =   0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.98
   TOTAL AREA(ACRES) =      149.1         PEAK FLOW RATE(CFS) =    215.17

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.85   FLOW VELOCITY(FEET/SEC.) =   8.83
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30519.00 =   4598.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30519.00 TO NODE  30519.00 IS CODE =  81
```

```
--------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   MAINLINE Tc(MIN.) =   17.59
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.975
   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             -       0.10      0.30     1.000      -
   USER-DEFINED             -       2.80      0.30     1.000      -
   USER-DEFINED             -       0.20      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) =     3.80      SUBAREA RUNOFF(CFS) =    5.73
   EFFECTIVE AREA(ACRES) =    146.13   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.98
   TOTAL AREA(ACRES) =       152.9        PEAK FLOW RATE(CFS) =    220.90
==========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =     152.9  TC(MIN.) =     17.59
   EFFECTIVE AREA(ACRES) =    146.13  AREA-AVERAGED Fm(INCH/HR)= 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.984
   PEAK FLOW RATE(CFS)    =     220.90

   ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc   Intensity  Fp(Fm)    Ap     Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)   NODE
      1      220.90  17.59   1.975  0.30( 0.30) 0.98   146.1   30510.00
      2      219.10  19.04   1.887  0.30( 0.30) 0.98   152.9   30500.00
==========================================================================
==========================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
_____
***********************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
            (c) Copyright 1983-2013 Advanced Engineering Software (aes)
              Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                     Michael Baker International
                    5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
  * RMV PA-3 WATERSHED 5B EXISTING CONDITION                            *
  * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
  * 25-YR EV MARCH 2019 CCHIU                                           *
  ***********************************************************************

  FILE NAME: X35B25EV.DAT
  TIME/DATE OF STUDY: 10:18 03/25/2019
================================================================================
  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   60.0    30.0     0.020/0.020/0.020  0.67    2.00 0.0313 0.167  0.0150
  2   50.0    25.0     0.020/0.020/0.020  0.67    2.00 0.0313 0.167  0.0150
  3   40.0    20.0     0.020/0.020/0.020  0.67    2.00 0.0313 0.167  0.0150
  4   30.0    15.0     0.020/0.020/0.020  0.67    2.00 0.0313 0.167  0.0150
  5   20.0    10.0     0.020/0.020/0.020  0.67    2.00 0.0313 0.167  0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30530.00 TO NODE  30531.00 IS CODE =  21
  ----------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   318.00
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   605.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.088
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.883
  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
  "CHAPARRAL,BROADLEAF"      -       0.05     0.30     1.000     0    9.09
  NATURAL FAIR COVER
  "OPEN BRUSH"               -       0.48     0.30     1.000     0    9.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     1.23
  TOTAL AREA(ACRES) =      0.53   PEAK FLOW RATE(CFS) =      1.23

  **********************************************************************************
  FLOW PROCESS FROM NODE  30531.00 TO NODE  30532.00 IS CODE =  51
  ----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   605.00  DOWNSTREAM(FEET) =   575.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   123.00   CHANNEL SLOPE = 0.2439
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.819
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA     Fp        Ap     SCS
         LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -       0.25     0.30     1.000     -
  USER-DEFINED               -       0.62     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) =      2.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.66
  AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   0.36
  Tc(MIN.) =    9.45
  SUBAREA AREA(ACRES) =     0.87       SUBAREA RUNOFF(CFS) =   1.97
  EFFECTIVE AREA(ACRES) =     1.40      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      1.4         PEAK FLOW RATE(CFS) =       3.17

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.41   FLOW VELOCITY(FEET/SEC.) =   6.15
  LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30532.00 =    441.00 FEET.

  **********************************************************************************
  FLOW PROCESS FROM NODE  30532.00 TO NODE  30533.00 IS CODE =  51
  ----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   575.00  DOWNSTREAM(FEET) =   565.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    67.00   CHANNEL SLOPE = 0.1493
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
```

```
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.785
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         0.45       0.30     1.000     -
   USER-DEFINED              -         0.47       0.30     1.000     -
   USER-DEFINED              -         0.01       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) =      4.21
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.48
   AVERAGE FLOW DEPTH(FEET) =  0.51   TRAVEL TIME(MIN.) =  0.20
   Tc(MIN.) =    9.65
   SUBAREA AREA(ACRES) =    0.93       SUBAREA RUNOFF(CFS) =    2.08
   EFFECTIVE AREA(ACRES) =    2.33     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       2.3         PEAK FLOW RATE(CFS) =      5.21

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.55   FLOW VELOCITY(FEET/SEC.) =  5.82
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30533.00 =    508.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30533.00 TO NODE  30534.00 IS CODE = 51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   565.00  DOWNSTREAM(FEET) =    540.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   172.00   CHANNEL SLOPE = 0.1453
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.712
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         0.01       0.30     1.000     -
   USER-DEFINED              -         0.65       0.30     1.000     -
   USER-DEFINED              -         0.52       0.30     1.000     -
   USER-DEFINED              -         0.36       0.30     1.000     -
   USER-DEFINED              -         0.01       0.30     1.000     -
   USER-DEFINED              -         0.34       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) =      7.26
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.28
   AVERAGE FLOW DEPTH(FEET) =  0.62   TRAVEL TIME(MIN.) =  0.46
   Tc(MIN.) =   10.11
   SUBAREA AREA(ACRES) =    1.89       SUBAREA RUNOFF(CFS) =    4.10
   EFFECTIVE AREA(ACRES) =    4.22     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) =      9.16

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.68   FLOW VELOCITY(FEET/SEC.) =  6.68
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30534.00 =    680.00 FEET.
```

```
*************************************************************************
   FLOW PROCESS FROM NODE  30534.00 TO NODE  30535.00 IS CODE = 51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   540.00  DOWNSTREAM(FEET) =    510.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   302.00   CHANNEL SLOPE = 0.0993
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.594
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         0.58       0.30     1.000     -
   USER-DEFINED              -         0.16       0.30     1.000     -
   USER-DEFINED              -         0.03       0.30     1.000     -
   USER-DEFINED              -         1.37       0.30     1.000     -
   USER-DEFINED              -         0.22       0.30     1.000     -
   USER-DEFINED              -         0.41       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) =     12.02
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.17
   AVERAGE FLOW DEPTH(FEET) =  0.81   TRAVEL TIME(MIN.) =  0.82
   Tc(MIN.) =   10.93
   SUBAREA AREA(ACRES) =    2.77       SUBAREA RUNOFF(CFS) =    5.72
   EFFECTIVE AREA(ACRES) =    6.99     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       7.0         PEAK FLOW RATE(CFS) =     14.43

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.86   FLOW VELOCITY(FEET/SEC.) =  6.43
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30535.00 =    982.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30535.00 TO NODE  30535.00 IS CODE = 81
 ------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =======================================================================
   MAINLINE Tc(MIN.) =   10.93
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.594
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         0.36       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) =    0.36       SUBAREA RUNOFF(CFS) =    0.74
   EFFECTIVE AREA(ACRES) =    7.35     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       7.3         PEAK FLOW RATE(CFS) =     15.17

*************************************************************************
   FLOW PROCESS FROM NODE  30535.00 TO NODE  30536.00 IS CODE = 51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    510.00  DOWNSTREAM(FEET) =     490.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  356.00   CHANNEL SLOPE = 0.0562
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.463
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
       LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED             -         0.85       0.30      1.000      -
  USER-DEFINED             -         0.32       0.30      1.000      -
  USER-DEFINED             -         0.09       0.30      1.000      -
  USER-DEFINED             -         2.69       0.30      1.000      -
  USER-DEFINED             -         0.84       0.30      1.000      -
  USER-DEFINED             -         1.63       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) =      21.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.73
  AVERAGE FLOW DEPTH(FEET) =  1.12    TRAVEL TIME(MIN.) =  1.04
  Tc(MIN.) =  11.96
  SUBAREA AREA(ACRES) =    6.42      SUBAREA RUNOFF(CFS) =  12.50
  EFFECTIVE AREA(ACRES) =     13.77     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      13.8        PEAK FLOW RATE(CFS) =     26.80

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.21   FLOW VELOCITY(FEET/SEC.) =  6.10
  LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30536.00 =   1338.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  30536.00 TO NODE  30536.00 IS CODE = 81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   11.96
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.463
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
       LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED             -         0.45       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) =   0.45       SUBAREA RUNOFF(CFS) =   0.88
  EFFECTIVE AREA(ACRES) =     14.22    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      14.2        PEAK FLOW RATE(CFS) =     27.68

**************************************************************************
  FLOW PROCESS FROM NODE  30536.00 TO NODE  30537.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =     455.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  556.00   CHANNEL SLOPE = 0.0629
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.314
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
       LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED             -         0.49       0.30      1.000      -
  USER-DEFINED             -         2.10       0.30      1.000      -
  USER-DEFINED             -         0.33       0.30      1.000      -
  USER-DEFINED             -         0.39       0.30      1.000      -
  USER-DEFINED             -         3.76       0.30      1.000      -
  USER-DEFINED             -         0.02       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) =      34.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.73
  AVERAGE FLOW DEPTH(FEET) =  1.30    TRAVEL TIME(MIN.) =  1.38
  Tc(MIN.) =  13.34
  SUBAREA AREA(ACRES) =    7.09      SUBAREA RUNOFF(CFS) =  12.85
  EFFECTIVE AREA(ACRES) =     21.31     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      21.3        PEAK FLOW RATE(CFS) =     38.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.36   FLOW VELOCITY(FEET/SEC.) =  6.95
  LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30537.00 =   1894.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  30537.00 TO NODE  30537.00 IS CODE = 81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   13.34
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.314
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
       LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED             -         0.49       0.30      1.000      -
  USER-DEFINED             -         3.83       0.30      1.000      -
  USER-DEFINED             -         0.39       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) =   4.71       SUBAREA RUNOFF(CFS) =   8.54
  EFFECTIVE AREA(ACRES) =     26.02    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      26.0        PEAK FLOW RATE(CFS) =     47.15

**************************************************************************
  FLOW PROCESS FROM NODE  30537.00 TO NODE  30538.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =     417.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  569.00   CHANNEL SLOPE = 0.0668
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
* 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.209
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
```

```
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        35.49     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) =      77.66
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.45
 AVERAGE FLOW DEPTH(FEET) =   1.75   TRAVEL TIME(MIN.) =   1.12
 Tc(MIN.) =   14.46
 SUBAREA AREA(ACRES) =    35.49       SUBAREA RUNOFF(CFS) =   60.98
 EFFECTIVE AREA(ACRES) =      61.51     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        61.5       PEAK FLOW RATE(CFS) =     105.68

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.96   FLOW VELOCITY(FEET/SEC.) =   9.14
 LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30538.00 =    2463.00 FEET.
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        61.5  TC(MIN.) =      14.46
 EFFECTIVE AREA(ACRES) =      61.51  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       105.68
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
_____
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                       Analysis prepared by:

                    Michael Baker International
                  5 Hutton Centre Drive Suite 500
                       Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 5C EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 25-YR EV MARCH 2019 CCHIU                                          *
 **********************************************************************

   FILE NAME: X35C25EV.DAT
   TIME/DATE OF STUDY: 10:18 03/25/2019
 ==============================================================================
   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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30550.00 TO NODE  30551.00 IS CODE =  21
 --------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==============================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
   ELEVATION DATA: UPSTREAM(FEET) =   865.00  DOWNSTREAM(FEET) =   700.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   8.249
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.047
   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
   "CHAPARRAL,BROADLEAF"    -       1.55    0.30     1.000      0   8.25
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =     3.83
   TOTAL AREA(ACRES) =      1.55   PEAK FLOW RATE(CFS) =      3.83

 **************************************************************************
   FLOW PROCESS FROM NODE  30551.00 TO NODE  30552.00 IS CODE =  51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   685.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   304.00   CHANNEL SLOPE = 0.0493
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.803
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA     Fp       Ap     SCS
        LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -       1.49    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) =     5.50
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.92
   AVERAGE FLOW DEPTH(FEET) =   0.68   TRAVEL TIME(MIN.) =   1.29
   Tc(MIN.) =   9.54
   SUBAREA AREA(ACRES) =     1.49     SUBAREA RUNOFF(CFS) =     3.35
   EFFECTIVE AREA(ACRES) =      3.03    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) =      6.84

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.74   FLOW VELOCITY(FEET/SEC.) =  4.13
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30552.00 =    634.00 FEET.

 **************************************************************************
   FLOW PROCESS FROM NODE  30552.00 TO NODE  30553.00 IS CODE =  51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   685.00  DOWNSTREAM(FEET) =   650.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   84.00   CHANNEL SLOPE = 0.4167
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.780
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
    LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        3.11     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) =      10.31
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.12
 AVERAGE FLOW DEPTH(FEET) =  0.58   TRAVEL TIME(MIN.) =  0.14
 Tc(MIN.) =  9.68
 SUBAREA AREA(ACRES) =    3.11      SUBAREA RUNOFF(CFS) =   6.95
 EFFECTIVE AREA(ACRES) =    6.15    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) =     13.72

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.65   FLOW VELOCITY(FEET/SEC.) = 10.97
 LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30553.00 =    718.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30553.00 TO NODE  30554.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =   620.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   370.00   CHANNEL SLOPE = 0.0811
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.629
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED            -        3.21     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) =      17.08
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.22
  AVERAGE FLOW DEPTH(FEET) =  0.96   TRAVEL TIME(MIN.) =  0.99
  Tc(MIN.) =  10.67
  SUBAREA AREA(ACRES) =    3.21      SUBAREA RUNOFF(CFS) =   6.72
  EFFECTIVE AREA(ACRES) =    9.35    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.4     PEAK FLOW RATE(CFS) =     19.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.00   FLOW VELOCITY(FEET/SEC.) =  6.48
  LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30554.00 =   1088.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30554.00 TO NODE  30555.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =   604.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   151.00   CHANNEL SLOPE = 0.1060
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.587
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED            -       14.25     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) =      34.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.21
  AVERAGE FLOW DEPTH(FEET) =  1.18   TRAVEL TIME(MIN.) =  0.31
  Tc(MIN.) =  10.98
  SUBAREA AREA(ACRES) =   14.25      SUBAREA RUNOFF(CFS) =  29.33
  EFFECTIVE AREA(ACRES) =   23.60    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       23.6     PEAK FLOW RATE(CFS) =     48.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.35   FLOW VELOCITY(FEET/SEC.) =  8.94
  LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30555.00 =   1239.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30555.00 TO NODE  30556.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    604.00  DOWNSTREAM(FEET) =   543.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1099.00   CHANNEL SLOPE = 0.0555
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.312
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED            -       23.90     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) =      70.25
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.71
  AVERAGE FLOW DEPTH(FEET) =  1.74   TRAVEL TIME(MIN.) =  2.37
  Tc(MIN.) =  13.35
  SUBAREA AREA(ACRES) =   23.90      SUBAREA RUNOFF(CFS) =  43.29
  EFFECTIVE AREA(ACRES) =   47.50    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       47.5     PEAK FLOW RATE(CFS) =     86.04

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.88   FLOW VELOCITY(FEET/SEC.) =  8.12
  LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30556.00 =   2338.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30556.00 TO NODE  30557.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    543.00  DOWNSTREAM(FEET) =   503.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1074.00   CHANNEL SLOPE = 0.0372
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.100
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap       SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        23.19      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) =    104.83
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.32
   AVERAGE FLOW DEPTH(FEET) =  2.18   TRAVEL TIME(MIN.) =  2.45
   Tc(MIN.) =  15.80
   SUBAREA AREA(ACRES) =    23.19      SUBAREA RUNOFF(CFS) =   37.56
   EFFECTIVE AREA(ACRES) =    70.69      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       70.7          PEAK FLOW RATE(CFS) =     114.52

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.26   FLOW VELOCITY(FEET/SEC.) =  7.50
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30557.00 =   3412.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30557.00 TO NODE  30558.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    503.00  DOWNSTREAM(FEET) =    460.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1155.00   CHANNEL SLOPE = 0.0372
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.938
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap       SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        59.03      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) =    158.06
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.13
   AVERAGE FLOW DEPTH(FEET) =  2.55   TRAVEL TIME(MIN.) =  2.37
   Tc(MIN.) =  18.16
   SUBAREA AREA(ACRES) =    59.03      SUBAREA RUNOFF(CFS) =   87.06
   EFFECTIVE AREA(ACRES) =   129.73      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      129.7          PEAK FLOW RATE(CFS) =     191.30

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.73   FLOW VELOCITY(FEET/SEC.) =  8.53
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30558.00 =   4567.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30558.00 TO NODE  30559.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    399.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1322.00   CHANNEL SLOPE = 0.0461
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.811
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap       SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        45.38      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) =    222.17
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.58
   AVERAGE FLOW DEPTH(FEET) =  2.78   TRAVEL TIME(MIN.) =  2.30
   Tc(MIN.) =  20.46
   SUBAREA AREA(ACRES) =    45.38      SUBAREA RUNOFF(CFS) =   61.70
   EFFECTIVE AREA(ACRES) =   175.11      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      175.1          PEAK FLOW RATE(CFS) =     238.06

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.85   FLOW VELOCITY(FEET/SEC.) =  9.77
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30559.00 =   5889.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30559.00 TO NODE  30560.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    399.00  DOWNSTREAM(FEET) =    375.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  373.00   CHANNEL SLOPE = 0.0643
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.783
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap       SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        12.10      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) =    246.14
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.15
   AVERAGE FLOW DEPTH(FEET) =  2.71   TRAVEL TIME(MIN.) =  0.56
   Tc(MIN.) =  21.02
   SUBAREA AREA(ACRES) =    12.10      SUBAREA RUNOFF(CFS) =   16.15
   EFFECTIVE AREA(ACRES) =   187.21      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      187.2          PEAK FLOW RATE(CFS) =     249.85

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.73   FLOW VELOCITY(FEET/SEC.) = 11.19
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30560.00 =   6262.00 FEET.
==========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =      187.2  TC(MIN.) =     21.02
   EFFECTIVE AREA(ACRES) =    187.21  AREA-AVERAGED Fm(INCH/HR)= 0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
```

```
  PEAK FLOW RATE(CFS)   =      249.85
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                    Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


  ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 5D EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 25-YR EV MARCH 2019 CCHIU                                             *
  **********************************************************************

  FILE NAME: X35D25EV.DAT
  TIME/DATE OF STUDY: 10:18 03/25/2019
 ===================================================================
  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  60.0     30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30520.00 TO NODE  30521.00 IS CODE =  21
 ------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   315.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    692.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.937
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.115
  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
  "CHAPARRAL,BROADLEAF"      -        1.83      0.30    1.000    0   7.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.63
  TOTAL AREA(ACRES) =       1.83   PEAK FLOW RATE(CFS) =       4.63

 ********************************************************************
  FLOW PROCESS FROM NODE  30521.00 TO NODE  30522.00 IS CODE =  51
 ------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    692.00  DOWNSTREAM(FEET) =    670.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  148.00   CHANNEL SLOPE = 0.1486
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.025
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp       Ap    SCS
        LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        0.75      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) =      5.55
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.90
  AVERAGE FLOW DEPTH(FEET) =    0.56   TRAVEL TIME(MIN.) =    0.42
  Tc(MIN.) =    8.36
  SUBAREA AREA(ACRES) =     0.75      SUBAREA RUNOFF(CFS) =    1.83
  EFFECTIVE AREA(ACRES) =      2.57      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) =      6.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   6.16
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30522.00 =     463.00 FEET.

 ********************************************************************
  FLOW PROCESS FROM NODE  30522.00 TO NODE  30523.00 IS CODE =  51
 ------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    670.00  DOWNSTREAM(FEET) =    654.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  104.00   CHANNEL SLOPE = 0.1538
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.972
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        1.72     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) =      8.37
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.70
 AVERAGE FLOW DEPTH(FEET) =  0.65   TRAVEL TIME(MIN.) =  0.26
 Tc(MIN.) =   8.61
 SUBAREA AREA(ACRES) =    1.72      SUBAREA RUNOFF(CFS) =    4.12
 EFFECTIVE AREA(ACRES) =    4.29    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       4.3      PEAK FLOW RATE(CFS) =     10.32

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.70   FLOW VELOCITY(FEET/SEC.) =  7.04
 LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30523.00 =    567.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30523.00 TO NODE  30524.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   654.00  DOWNSTREAM(FEET) =    615.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  378.00   CHANNEL SLOPE = 0.1032
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.796
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        3.19     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) =     13.90
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.51
 AVERAGE FLOW DEPTH(FEET) =  0.84   TRAVEL TIME(MIN.) =  0.97
 Tc(MIN.) =   9.58
 SUBAREA AREA(ACRES) =    3.19      SUBAREA RUNOFF(CFS) =    7.17
 EFFECTIVE AREA(ACRES) =    7.48    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       7.5      PEAK FLOW RATE(CFS) =     16.81

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.91   FLOW VELOCITY(FEET/SEC.) =  6.84
 LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30524.00 =    945.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30524.00 TO NODE  30525.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   615.00  DOWNSTREAM(FEET) =    593.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  190.00   CHANNEL SLOPE = 0.1158
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.731
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        6.94     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) =     24.40
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.83
 AVERAGE FLOW DEPTH(FEET) =  1.02   TRAVEL TIME(MIN.) =  0.40
 Tc(MIN.) =   9.99
 SUBAREA AREA(ACRES) =    6.94      SUBAREA RUNOFF(CFS) =   15.19
 EFFECTIVE AREA(ACRES) =   14.42    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      14.4      PEAK FLOW RATE(CFS) =     31.56

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.12   FLOW VELOCITY(FEET/SEC.) =  8.32
 LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30525.00 =   1135.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30525.00 TO NODE  30526.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   593.00  DOWNSTREAM(FEET) =    545.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  642.00   CHANNEL SLOPE = 0.0748
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 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             -        9.38     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) =     40.97
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.54
 AVERAGE FLOW DEPTH(FEET) =  1.35   TRAVEL TIME(MIN.) =  1.42
 Tc(MIN.) =  11.41
 SUBAREA AREA(ACRES) =    9.38      SUBAREA RUNOFF(CFS) =   18.82
 EFFECTIVE AREA(ACRES) =   23.80    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      23.8      PEAK FLOW RATE(CFS) =     47.78

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.42   FLOW VELOCITY(FEET/SEC.) =  7.86
 LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30526.00 =   1777.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30526.00 TO NODE  30527.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   545.00  DOWNSTREAM(FEET) =    483.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1032.00   CHANNEL SLOPE = 0.0601
```

```
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.288
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        21.43     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) =       66.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.83
  AVERAGE FLOW DEPTH(FEET) =  1.69   TRAVEL TIME(MIN.) =  2.20
  Tc(MIN.) =   13.60
  SUBAREA AREA(ACRES) =    21.43      SUBAREA RUNOFF(CFS) =   38.33
  EFFECTIVE AREA(ACRES) =     45.23      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        45.2         PEAK FLOW RATE(CFS) =       80.91

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.81   FLOW VELOCITY(FEET/SEC.) =  8.22
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30527.00 =   2809.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  30527.00 TO NODE  30528.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    483.00  DOWNSTREAM(FEET) =    456.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   473.00   CHANNEL SLOPE =  0.0571
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.201
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        11.90     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) =       91.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.32
  AVERAGE FLOW DEPTH(FEET) =  1.91   TRAVEL TIME(MIN.) =   0.95
  Tc(MIN.) =   14.55
  SUBAREA AREA(ACRES) =    11.90      SUBAREA RUNOFF(CFS) =   20.36
  EFFECTIVE AREA(ACRES) =     57.13      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        57.1         PEAK FLOW RATE(CFS) =       97.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.96   FLOW VELOCITY(FEET/SEC.) =  8.45
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30528.00 =   3282.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       57.1  TC(MIN.) =     14.55
  EFFECTIVE AREA(ACRES) =     57.13  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       97.75
==============================================================================
```

```
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                      Michael Baker International
                    5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 6 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 25-YR EV MARCH 2019 CCHIU                                          *
 *********************************************************************

   FILE NAME: X30625EV.DAT
   TIME/DATE OF STUDY: 10:24 03/25/2019
==================================================================================
   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  60.0   30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   2  50.0   25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   3  40.0   20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   4  30.0   15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   5  20.0   10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30600.00 TO NODE  30601.00 IS CODE =  21
--------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==================================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   328.00
   ELEVATION DATA: UPSTREAM(FEET) =    552.00  DOWNSTREAM(FEET) =     508.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.706
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.624
   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"              -       0.29     0.30      1.000    0   10.71
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.60
   TOTAL AREA(ACRES) =        0.29   PEAK FLOW RATE(CFS) =       0.60

****************************************************************************
   FLOW PROCESS FROM NODE  30601.00 TO NODE  30602.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    508.00  DOWNSTREAM(FEET) =    480.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   176.00   CHANNEL SLOPE = 0.1591
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.523
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       0.29     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) =      0.89
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.87
   AVERAGE FLOW DEPTH(FEET) =   0.28   TRAVEL TIME(MIN.) =   0.76
   Tc(MIN.) =   11.46
   SUBAREA AREA(ACRES) =       0.29      SUBAREA RUNOFF(CFS) =      0.59
   EFFECTIVE AREA(ACRES) =       0.58      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =       1.16

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.31   FLOW VELOCITY(FEET/SEC.) =   4.08
   LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30602.00 =     504.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30602.00 TO NODE  30603.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    480.00  DOWNSTREAM(FEET) =    401.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   326.00   CHANNEL SLOPE = 0.2423
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.405
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
     DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
        LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED               -        0.76       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) =      1.88
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.40
   AVERAGE FLOW DEPTH(FEET) =  0.34   TRAVEL TIME(MIN.) =  1.01
   Tc(MIN.) =  12.47
   SUBAREA AREA(ACRES) =     0.76     SUBAREA RUNOFF(CFS) =   1.43
   EFFECTIVE AREA(ACRES) =     1.34     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) =      2.53

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.38   FLOW VELOCITY(FEET/SEC.) = 5.88
   LONGEST FLOWPATH FROM NODE 30600.00 TO NODE 30603.00 =    830.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  30603.00 TO NODE  30604.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    401.00  DOWNSTREAM(FEET) =    385.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  106.00   CHANNEL SLOPE = 0.1509
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.369
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        0.33       0.30      1.000      -
   USER-DEFINED              -        0.62       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) =      3.41
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.32
   AVERAGE FLOW DEPTH(FEET) =  0.46   TRAVEL TIME(MIN.) =  0.33
   Tc(MIN.) =  12.80
   SUBAREA AREA(ACRES) =     0.95     SUBAREA RUNOFF(CFS) =   1.77
   EFFECTIVE AREA(ACRES) =     2.29     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        2.3      PEAK FLOW RATE(CFS) =      4.26

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.51   FLOW VELOCITY(FEET/SEC.) = 5.53
   LONGEST FLOWPATH FROM NODE 30600.00 TO NODE 30604.00 =    936.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE = 81
--------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   MAINLINE Tc(MIN.) =  12.80
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.369
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
```

```
     LAND USE              GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        1.27       0.30      1.000      -
   USER-DEFINED              -        0.26       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) =    1.53     SUBAREA RUNOFF(CFS) =    2.85
   EFFECTIVE AREA(ACRES) =     3.82   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        3.8      PEAK FLOW RATE(CFS) =       7.10

**************************************************************************
   FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE = 81
--------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   MAINLINE Tc(MIN.) =  12.80
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.369
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        1.01       0.30      1.000      -
   USER-DEFINED              -        0.29       0.30      1.000      -
   USER-DEFINED              -        0.99       0.30      1.000      -
   USER-DEFINED              -        2.11       0.30      1.000      -
   USER-DEFINED              -        1.41       0.30      1.000      -
   USER-DEFINED              -        0.02       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) =    5.83     SUBAREA RUNOFF(CFS) =   10.85
   EFFECTIVE AREA(ACRES) =     9.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        9.6      PEAK FLOW RATE(CFS) =      17.96

**************************************************************************
   FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE = 81
--------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   MAINLINE Tc(MIN.) =  12.80
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.369
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        0.21       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) =    0.21     SUBAREA RUNOFF(CFS) =    0.39
   EFFECTIVE AREA(ACRES) =     9.86   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        9.9      PEAK FLOW RATE(CFS) =      18.35
==========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =        9.9   TC(MIN.) =      12.80
   EFFECTIVE AREA(ACRES) =      9.86  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)    =       18.35
==========================================================================
==========================================================================
```

END OF RATIONAL METHOD ANALYSIS

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

                    Michael Baker International
                    5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 7 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 25-YR EV MARCH 2019 CCHIU                                            *
 ************************************************************************

   FILE NAME: X30725EV.DAT
   TIME/DATE OF STUDY: 10:26 03/25/2019
 ===================================================================
   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  60.0    30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30700.00 TO NODE  30701.00 IS CODE =  21
 ------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
   ELEVATION DATA: UPSTREAM(FEET) =    760.00  DOWNSTREAM(FEET) =     600.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.225
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.052
   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
   "CHAPARRAL,BROADLEAF"     -        1.30     0.30     1.000     0  8.22
   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  30701.00 TO NODE  30702.00 IS CODE =  51
 ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    545.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   378.00   CHANNEL SLOPE = 0.1455
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.850
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap    SCS
       LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
   USER-DEFINED              -        2.43     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) =    6.02
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.03
   AVERAGE FLOW DEPTH(FEET) =   0.58   TRAVEL TIME(MIN.) =   1.04
   Tc(MIN.) =   9.27
   SUBAREA AREA(ACRES) =    2.43       SUBAREA RUNOFF(CFS) =    5.58
   EFFECTIVE AREA(ACRES) =       3.74      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        3.7         PEAK FLOW RATE(CFS) =        8.57

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.66   FLOW VELOCITY(FEET/SEC.) =   6.54
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30702.00 =     703.00 FEET.

 ********************************************************************************
   FLOW PROCESS FROM NODE  30702.00 TO NODE  30703.00 IS CODE =  51
 ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    539.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    71.00   CHANNEL SLOPE = 0.0845
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.814
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
    LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        2.09     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) =     10.94
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.64
 AVERAGE FLOW DEPTH(FEET) =  0.80   TRAVEL TIME(MIN.) =  0.21
 Tc(MIN.) =   9.48
 SUBAREA AREA(ACRES) =     2.09      SUBAREA RUNOFF(CFS) =    4.73
 EFFECTIVE AREA(ACRES) =     5.83    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) =     13.18

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.86   FLOW VELOCITY(FEET/SEC.) =  5.95
 LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30703.00 =    774.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30703.00 TO NODE  30704.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    539.00  DOWNSTREAM(FEET) =    509.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   317.00   CHANNEL SLOPE = 0.0946
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 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             -        2.46     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) =     15.82
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.47
 AVERAGE FLOW DEPTH(FEET) =  0.90   TRAVEL TIME(MIN.) =  0.82
 Tc(MIN.) =  10.30
 SUBAREA AREA(ACRES) =     2.46      SUBAREA RUNOFF(CFS) =    5.28
 EFFECTIVE AREA(ACRES) =     8.29    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       8.3      PEAK FLOW RATE(CFS) =     17.78

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.94   FLOW VELOCITY(FEET/SEC.) =  6.69
 LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30704.00 =   1091.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30704.00 TO NODE  30705.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    509.00  DOWNSTREAM(FEET) =    484.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   294.00   CHANNEL SLOPE = 0.0850
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.580
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
    LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        2.96     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) =     20.82
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.68
 AVERAGE FLOW DEPTH(FEET) =  1.02   TRAVEL TIME(MIN.) =  0.73
 Tc(MIN.) =  11.03
 SUBAREA AREA(ACRES) =     2.96      SUBAREA RUNOFF(CFS) =    6.08
 EFFECTIVE AREA(ACRES) =    11.25    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) =     23.09

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.06   FLOW VELOCITY(FEET/SEC.) =  6.88
 LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30705.00 =   1385.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30705.00 TO NODE  30706.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    484.00  DOWNSTREAM(FEET) =    464.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   257.00   CHANNEL SLOPE = 0.0778
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.502
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
    LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        7.40     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) =     30.42
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.10
 AVERAGE FLOW DEPTH(FEET) =  1.19   TRAVEL TIME(MIN.) =  0.60
 Tc(MIN.) =  11.63
 SUBAREA AREA(ACRES) =     7.40      SUBAREA RUNOFF(CFS) =   14.67
 EFFECTIVE AREA(ACRES) =    18.66    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      18.7      PEAK FLOW RATE(CFS) =     36.98

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.29   FLOW VELOCITY(FEET/SEC.) =  7.45
 LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30706.00 =   1642.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  30706.00 TO NODE  30707.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    464.00  DOWNSTREAM(FEET) =    455.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   147.00   CHANNEL SLOPE = 0.0612
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   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.461
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         7.29     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) =      44.06
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.11
   AVERAGE FLOW DEPTH(FEET) =  1.44    TRAVEL TIME(MIN.) =   0.34
   Tc(MIN.) =   11.98
   SUBAREA AREA(ACRES) =      7.29      SUBAREA RUNOFF(CFS) =   14.17
   EFFECTIVE AREA(ACRES) =     25.94      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       25.9         PEAK FLOW RATE(CFS) =       50.45

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.51    FLOW VELOCITY(FEET/SEC.) =  7.34
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30707.00 =    1789.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30707.00 TO NODE  30708.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =     432.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   461.00   CHANNEL SLOPE = 0.0499
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.340
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         5.94     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) =      55.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.02
   AVERAGE FLOW DEPTH(FEET) =  1.63    TRAVEL TIME(MIN.) =   1.10
   Tc(MIN.) =   13.07
   SUBAREA AREA(ACRES) =      5.94      SUBAREA RUNOFF(CFS) =   10.91
   EFFECTIVE AREA(ACRES) =     31.89      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       31.9         PEAK FLOW RATE(CFS) =       58.56

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.66    FLOW VELOCITY(FEET/SEC.) =  7.08
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30708.00 =    2250.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30708.00 TO NODE  30709.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    432.00  DOWNSTREAM(FEET) =     422.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE = 0.0588
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.304
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        13.07     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) =      70.35
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.86
   AVERAGE FLOW DEPTH(FEET) =  1.73    TRAVEL TIME(MIN.) =   0.36
   Tc(MIN.) =   13.43
   SUBAREA AREA(ACRES) =     13.07      SUBAREA RUNOFF(CFS) =   23.58
   EFFECTIVE AREA(ACRES) =     44.95      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       45.0         PEAK FLOW RATE(CFS) =       81.09

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.82    FLOW VELOCITY(FEET/SEC.) =  8.17
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30709.00 =    2420.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30709.00 TO NODE  30710.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    422.00  DOWNSTREAM(FEET) =     377.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1074.00   CHANNEL SLOPE = 0.0419
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.099
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        19.46     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) =      96.85
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.52
   AVERAGE FLOW DEPTH(FEET) =  2.07    TRAVEL TIME(MIN.) =   2.38
   Tc(MIN.) =   15.81
   SUBAREA AREA(ACRES) =     19.46      SUBAREA RUNOFF(CFS) =   31.50
   EFFECTIVE AREA(ACRES) =     64.41      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       64.4         PEAK FLOW RATE(CFS) =      104.27

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.13    FLOW VELOCITY(FEET/SEC.) =  7.65
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30710.00 =    3494.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30710.00 TO NODE  30711.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    377.00  DOWNSTREAM(FEET) =    345.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   546.00   CHANNEL SLOPE = 0.0586
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.038
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -         9.60      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) =    111.78
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.96
  AVERAGE FLOW DEPTH(FEET) =   1.84   TRAVEL TIME(MIN.) =   0.83
  Tc(MIN.) =   16.64
  SUBAREA AREA(ACRES) =      9.60        SUBAREA RUNOFF(CFS) =   15.02
  EFFECTIVE AREA(ACRES) =     74.01     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       74.0        PEAK FLOW RATE(CFS) =    115.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.87   FLOW VELOCITY(FEET/SEC.) = 11.08
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30711.00 =   4040.00 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        74.0  TC(MIN.) =     16.64
  EFFECTIVE AREA(ACRES) =      74.01  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =      115.78
================================================================================
================================================================================
  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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             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                       Analysis prepared by:

                     Michael Baker International
                   5 Hutton Centre Drive Suite 500
                       Santa Ana, CA92707


  *************************** DESCRIPTION OF STUDY ***************************
 * RMV PA-3 WATERSHED 8 EXISTING CONDITION                                 *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                   *
 * 25-YR EV MARCH 2019 CCHIU                                               *
  *************************************************************************

   FILE NAME: X30825EV.DAT
   TIME/DATE OF STUDY: 10:27 03/25/2019
 ==============================================================================
   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  60.0    30.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30800.00 TO NODE  30801.00 IS CODE =  21
 ---------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==============================================================================
```

Date: 04/20/2019   File name: X30825EV.RES   Page 1

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   324.00
   ELEVATION DATA: UPSTREAM(FEET) =    646.00  DOWNSTREAM(FEET) =    573.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.604
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.793
   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
   "CHAPARRAL,BROADLEAF"    -        0.69    0.30     1.000     0   9.60
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      1.54
   TOTAL AREA(ACRES) =       0.69   PEAK FLOW RATE(CFS) =       1.54

 *****************************************************************************
   FLOW PROCESS FROM NODE  30801.00 TO NODE  30802.00 IS CODE =  51
 ---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    573.00  DOWNSTREAM(FEET) =    538.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   104.00   CHANNEL SLOPE = 0.3365
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.750
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp       Ap     SCS
         LAND USE         GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED            -        1.06    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) =      2.71
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.64
   AVERAGE FLOW DEPTH(FEET) =   0.37   TRAVEL TIME(MIN.) =   0.26
   Tc(MIN.) =   9.87
   SUBAREA AREA(ACRES) =     1.06      SUBAREA RUNOFF(CFS) =    2.35
   EFFECTIVE AREA(ACRES) =      1.75     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        1.8       PEAK FLOW RATE(CFS) =      3.86

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   7.41
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30802.00 =    428.00 FEET.

 *****************************************************************************
   FLOW PROCESS FROM NODE  30802.00 TO NODE  30803.00 IS CODE =  51
 ---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    538.00  DOWNSTREAM(FEET) =    500.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE = 0.2289
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.689
   SUBAREA LOSS RATE DATA(AMC  II):
```

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```
 DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED              -         1.89     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) =      5.89
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.01
 AVERAGE FLOW DEPTH(FEET) =   0.53   TRAVEL TIME(MIN.) =   0.39
 Tc(MIN.) =   10.26
 SUBAREA AREA(ACRES) =     1.89      SUBAREA RUNOFF(CFS) =    4.07
 EFFECTIVE AREA(ACRES) =      3.64    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) =       7.83

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.58   FLOW VELOCITY(FEET/SEC.) =   7.64
 LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30803.00 =    594.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  30803.00 TO NODE  30804.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    447.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   284.00   CHANNEL SLOPE = 0.1866
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.601
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         3.78     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) =      11.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.72
  AVERAGE FLOW DEPTH(FEET) =   0.71   TRAVEL TIME(MIN.) =   0.61
  Tc(MIN.) =   10.87
  SUBAREA AREA(ACRES) =     3.78      SUBAREA RUNOFF(CFS) =    7.84
  EFFECTIVE AREA(ACRES) =      7.43    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =      15.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.78   FLOW VELOCITY(FEET/SEC.) =   8.36
  LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30804.00 =    878.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  30804.00 TO NODE  30805.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =    438.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   101.00   CHANNEL SLOPE = 0.0891
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.567
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED              -         4.22     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) =      19.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.71
 AVERAGE FLOW DEPTH(FEET) =   0.99   TRAVEL TIME(MIN.) =   0.25
 Tc(MIN.) =   11.12
 SUBAREA AREA(ACRES) =     4.22      SUBAREA RUNOFF(CFS) =    8.62
 EFFECTIVE AREA(ACRES) =     11.65    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      23.78

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.06   FLOW VELOCITY(FEET/SEC.) =   7.01
 LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30805.00 =    979.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  30805.00 TO NODE  30806.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   438.00  DOWNSTREAM(FEET) =   419.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   418.00   CHANNEL SLOPE = 0.0455
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.421
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         7.15     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) =      30.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.81
  AVERAGE FLOW DEPTH(FEET) =   1.32   TRAVEL TIME(MIN.) =   1.20
  Tc(MIN.) =   12.32
  SUBAREA AREA(ACRES) =     7.15      SUBAREA RUNOFF(CFS) =   13.66
  EFFECTIVE AREA(ACRES) =     18.80    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       18.8       PEAK FLOW RATE(CFS) =      35.90

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.41   FLOW VELOCITY(FEET/SEC.) =   6.05
  LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30806.00 =   1397.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  30806.00 TO NODE  30807.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   419.00  DOWNSTREAM(FEET) =   395.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   499.00   CHANNEL SLOPE = 0.0481
```

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   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.289
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         9.75      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) =     44.63
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.54
   AVERAGE FLOW DEPTH(FEET) =  1.51   TRAVEL TIME(MIN.) =   1.27
   Tc(MIN.) =   13.59
   SUBAREA AREA(ACRES) =      9.75       SUBAREA RUNOFF(CFS) =   17.45
   EFFECTIVE AREA(ACRES) =     28.56      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      28.6          PEAK FLOW RATE(CFS) =     51.11

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.59   FLOW VELOCITY(FEET/SEC.) =  6.74
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30807.00 =   1896.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30807.00 TO NODE  30808.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    395.00  DOWNSTREAM(FEET) =    358.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   698.00   CHANNEL SLOPE =  0.0530
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.147
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        10.78      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) =     60.07
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.28
   AVERAGE FLOW DEPTH(FEET) =  1.66   TRAVEL TIME(MIN.) =   1.60
   Tc(MIN.) =   15.19
   SUBAREA AREA(ACRES) =     10.78       SUBAREA RUNOFF(CFS) =   17.92
   EFFECTIVE AREA(ACRES) =     39.33      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      39.3          PEAK FLOW RATE(CFS) =     65.40

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.71   FLOW VELOCITY(FEET/SEC.) =  7.44
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30808.00 =   2594.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30808.00 TO NODE  30809.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =    332.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   102.00   CHANNEL SLOPE =  0.2549
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.140
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        10.00      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) =     73.68
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  17.20
   AVERAGE FLOW DEPTH(FEET) =  1.19   TRAVEL TIME(MIN.) =   0.10
   Tc(MIN.) =   15.29
   SUBAREA AREA(ACRES) =     10.00       SUBAREA RUNOFF(CFS) =   16.56
   EFFECTIVE AREA(ACRES) =     49.33      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      49.3          PEAK FLOW RATE(CFS) =     81.68

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.25   FLOW VELOCITY(FEET/SEC.) =  17.52
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30809.00 =   2696.00 FEET.
==========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)       =       49.3   TC(MIN.) =     15.29
   EFFECTIVE AREA(ACRES) =     49.33  AREA-AVERAGED Fm(INCH/HR)= 0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)     =      81.68
==========================================================================

==========================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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

                        Michael Baker International
                       5 Hutton Centre Drive Suite 500
                           Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY ***************************
 * RMV PA-3 WATERSHED 9A EXISTING CONDITION                                *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                   *
 * 25-YR EV MARCH 2019 CCHIU                                               *
 **************************************************************************

  FILE NAME: X39A25EV.DAT
  TIME/DATE OF STUDY: 10:19 03/25/2019
============================================================================
  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   60.0    30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30900.00 TO NODE  30901.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
  ELEVATION DATA: UPSTREAM(FEET) =    558.00  DOWNSTREAM(FEET) =    510.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.464
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.659
  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  10.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.27
  TOTAL AREA(ACRES) =       0.60   PEAK FLOW RATE(CFS) =      1.27

****************************************************************************
  FLOW PROCESS FROM NODE  30901.00 TO NODE  30902.00 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    510.00  DOWNSTREAM(FEET) =    470.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   107.00   CHANNEL SLOPE = 0.3738
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.621
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap     SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -        1.02     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) =     2.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.72
  AVERAGE FLOW DEPTH(FEET) =   0.34    TRAVEL TIME(MIN.) =   0.27
  Tc(MIN.) =   10.73
  SUBAREA AREA(ACRES) =     1.02      SUBAREA RUNOFF(CFS) =    2.14
  EFFECTIVE AREA(ACRES) =      1.62     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.6        PEAK FLOW RATE(CFS) =      3.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   7.35
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30902.00 =    432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30902.00 TO NODE  30903.00 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    445.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   126.00   CHANNEL SLOPE = 0.1984
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.576
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        1.53      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) =      4.95
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.39
 AVERAGE FLOW DEPTH(FEET) =  0.51   TRAVEL TIME(MIN.) =  0.33
 Tc(MIN.) =  11.06
 SUBAREA AREA(ACRES) =     1.53      SUBAREA RUNOFF(CFS) =    3.13
 EFFECTIVE AREA(ACRES) =      3.15    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) =      6.46

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.56   FLOW VELOCITY(FEET/SEC.) =  6.87
 LONGEST FLOWPATH FROM NODE 30900.00 TO NODE 30903.00 =   558.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE 30903.00 TO NODE 30904.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    445.00  DOWNSTREAM(FEET) =    404.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   252.00   CHANNEL SLOPE = 0.1627
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.499
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        3.07      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) =      9.49
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.96
 AVERAGE FLOW DEPTH(FEET) =  0.67   TRAVEL TIME(MIN.) =  0.60
 Tc(MIN.) =  11.66
 SUBAREA AREA(ACRES) =     3.07      SUBAREA RUNOFF(CFS) =    6.07
 EFFECTIVE AREA(ACRES) =      6.22    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        6.2      PEAK FLOW RATE(CFS) =     12.30

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.74   FLOW VELOCITY(FEET/SEC.) =  7.43
 LONGEST FLOWPATH FROM NODE 30900.00 TO NODE 30904.00 =   810.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE 30904.00 TO NODE 30905.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    404.00  DOWNSTREAM(FEET) =    356.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   544.00   CHANNEL SLOPE = 0.0882
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

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 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.339
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        4.76      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) =     16.67
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.38
 AVERAGE FLOW DEPTH(FEET) =  0.93   TRAVEL TIME(MIN.) =  1.42
 Tc(MIN.) =  13.08
 SUBAREA AREA(ACRES) =     4.76      SUBAREA RUNOFF(CFS) =    8.74
 EFFECTIVE AREA(ACRES) =     10.98    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       11.0      PEAK FLOW RATE(CFS) =     20.15

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.00   FLOW VELOCITY(FEET/SEC.) =  6.69
 LONGEST FLOWPATH FROM NODE 30900.00 TO NODE 30905.00 =  1354.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE 30905.00 TO NODE 30906.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    356.00  DOWNSTREAM(FEET) =    332.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   335.00   CHANNEL SLOPE = 0.0716
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.260
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -       12.78      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) =     31.43
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.91
 AVERAGE FLOW DEPTH(FEET) =  1.23   TRAVEL TIME(MIN.) =  0.81
 Tc(MIN.) =  13.89
 SUBAREA AREA(ACRES) =    12.78      SUBAREA RUNOFF(CFS) =   22.55
 EFFECTIVE AREA(ACRES) =     23.76    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       23.8      PEAK FLOW RATE(CFS) =     41.92

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.37   FLOW VELOCITY(FEET/SEC.) =  7.46
 LONGEST FLOWPATH FROM NODE 30900.00 TO NODE 30906.00 =  1689.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE 30906.00 TO NODE 30907.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    332.00  DOWNSTREAM(FEET) =    305.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   447.00   CHANNEL SLOPE = 0.0604
```

```
CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =    3.000
MANNING'S FACTOR = 0.030    MAXIMUM DEPTH(FEET) =  20.00
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.186
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
    LAND USE              GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
USER-DEFINED                -        7.40      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) =      48.20
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.97
AVERAGE FLOW DEPTH(FEET) =   1.34    TRAVEL TIME(MIN.) =   0.83
Tc(MIN.) =   14.72
SUBAREA AREA(ACRES) =      7.40        SUBAREA RUNOFF(CFS) =   12.56
EFFECTIVE AREA(ACRES) =      31.16      AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30   AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =       31.2        PEAK FLOW RATE(CFS) =      52.90

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.38    FLOW VELOCITY(FEET/SEC.) =   9.21
LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30907.00 =    2136.00 FEET.
===============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =        31.2  TC(MIN.) =      14.72
EFFECTIVE AREA(ACRES) =       31.16  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)    =       52.90
===============================================================================
===============================================================================
END OF RATIONAL METHOD ANALYSIS
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****************************************************************************
        RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                          Analysis prepared by:

                       Michael Baker International
                      5 Hutton Centre Drive Suite 500
                           Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 9B EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 25-YR EV MARCH 2019 CCHIU                                           *
 *********************************************************************

   FILE NAME: X39B25EV.DAT
   TIME/DATE OF STUDY: 10:19 03/25/2019
========================================================================
   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   60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  30910.00 TO NODE  30911.00 IS CODE = 21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
   ELEVATION DATA: UPSTREAM(FEET) =    479.00  DOWNSTREAM(FEET) =    428.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.414
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.666
   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
   "GRASS"                   -        0.34      0.30     1.000    0   10.41
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.72
   TOTAL AREA(ACRES) =        0.34    PEAK FLOW RATE(CFS) =        0.72

****************************************************************************
   FLOW PROCESS FROM NODE  30911.00 TO NODE  30912.00 IS CODE = 51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    428.00  DOWNSTREAM(FEET) =    380.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    91.00   CHANNEL SLOPE = 0.5275
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 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
   USER-DEFINED               -       0.87      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) =    1.63
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.96
   AVERAGE FLOW DEPTH(FEET) =   0.28    TRAVEL TIME(MIN.) =   0.22
   Tc(MIN.) =   10.63
   SUBAREA AREA(ACRES) =     0.87       SUBAREA RUNOFF(CFS) =    1.82
   EFFECTIVE AREA(ACRES) =      1.20      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       2.53

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   7.70
   LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30912.00 =    420.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30912.00 TO NODE  30913.00 IS CODE = 51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    380.00  DOWNSTREAM(FEET) =    372.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    91.00   CHANNEL SLOPE = 0.0879
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.586
   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      -
 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) =        3.36
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.33
 AVERAGE FLOW DEPTH(FEET) =   0.51   TRAVEL TIME(MIN.) =   0.35
 Tc(MIN.) =   10.98
 SUBAREA AREA(ACRES) =      0.80      SUBAREA RUNOFF(CFS) =   1.65
 EFFECTIVE AREA(ACRES) =      2.01     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.0         PEAK FLOW RATE(CFS) =      4.13

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.55   FLOW VELOCITY(FEET/SEC.) =  4.52
 LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30913.00 =    511.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30913.00 TO NODE  30914.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =    355.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   111.00   CHANNEL SLOPE = 0.1532
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.545
  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      -
  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) =        5.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.96
  AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   0.31
  Tc(MIN.) =   11.29
  SUBAREA AREA(ACRES) =      1.30      SUBAREA RUNOFF(CFS) =   2.64
  EFFECTIVE AREA(ACRES) =      3.31     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =      6.69

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.60   FLOW VELOCITY(FEET/SEC.) =  6.24
  LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30914.00 =    622.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30914.00 TO NODE  30915.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    340.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   236.00   CHANNEL SLOPE = 0.0636
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.445
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
      LAND USE           GROUP      (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED            -         1.86      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) =        8.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.80
  AVERAGE FLOW DEPTH(FEET) =   0.77   TRAVEL TIME(MIN.) =   0.82
  Tc(MIN.) =   12.11
  SUBAREA AREA(ACRES) =      1.86      SUBAREA RUNOFF(CFS) =   3.59
  EFFECTIVE AREA(ACRES) =      5.17     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.2         PEAK FLOW RATE(CFS) =      9.98

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.82   FLOW VELOCITY(FEET/SEC.) =  4.96
  LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30915.00 =    858.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30915.00 TO NODE  30916.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    340.00  DOWNSTREAM(FEET) =    317.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   366.00   CHANNEL SLOPE = 0.0628
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.319
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
      LAND USE           GROUP      (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED            -         2.39      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) =       12.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.20
  AVERAGE FLOW DEPTH(FEET) =   0.88   TRAVEL TIME(MIN.) =   1.17
  Tc(MIN.) =   13.28
  SUBAREA AREA(ACRES) =      2.39      SUBAREA RUNOFF(CFS) =   4.34
  EFFECTIVE AREA(ACRES) =      7.56     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.6         PEAK FLOW RATE(CFS) =     13.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.93   FLOW VELOCITY(FEET/SEC.) =  5.34
  LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30916.00 =   1224.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30916.00 TO NODE  30917.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    317.00  DOWNSTREAM(FEET) =    295.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   346.00   CHANNEL SLOPE = 0.0636
```

```
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.224
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) =      17.80
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.73
AVERAGE FLOW DEPTH(FEET) =   1.02   TRAVEL TIME(MIN.) =   1.01
Tc(MIN.) =   14.29
SUBAREA AREA(ACRES) =    4.70       SUBAREA RUNOFF(CFS) =    8.14
EFFECTIVE AREA(ACRES) =     12.26     AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =      12.3         PEAK FLOW RATE(CFS) =      21.22

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.09   FLOW VELOCITY(FEET/SEC.) =   6.00
LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30917.00 =    1570.00 FEET.
==============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =        12.3  TC(MIN.) =      14.29
EFFECTIVE AREA(ACRES) =      12.26  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)   =       21.22
==============================================================================
==============================================================================
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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                         Analysis prepared by:

                      Michael Baker International
                     5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 10 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 25-YR EV MARCH 2019 CCHIU                                           *
 **********************************************************************

   FILE NAME: X31025EV.DAT
   TIME/DATE OF STUDY: 10:27 03/25/2019
 ========================================================================
   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   60.0    30.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31000.00 TO NODE  31001.00 IS CODE =  21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
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Date: 04/20/2019   File name: X31025EV.RES   Page 1

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   INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
   ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM(FEET) =    455.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.457
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.818
   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
   "GRASS"                    -        0.99     0.30    1.000     0   9.46
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      2.24
   TOTAL AREA(ACRES) =       0.99   PEAK FLOW RATE(CFS) =       2.24

 *************************************************************************
   FLOW PROCESS FROM NODE  31001.00 TO NODE  31002.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   455.00  DOWNSTREAM(FEET) =    430.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  222.00   CHANNEL SLOPE = 0.1126
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.694
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp       Ap    SCS
        LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED                -       1.27     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) =      3.62
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.81
   AVERAGE FLOW DEPTH(FEET) =   0.50    TRAVEL TIME(MIN.) =   0.77
   Tc(MIN.) =   10.23
   SUBAREA AREA(ACRES) =      1.27      SUBAREA RUNOFF(CFS) =    2.75
   EFFECTIVE AREA(ACRES) =      2.26      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =      4.88

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.56   FLOW VELOCITY(FEET/SEC.) =   5.15
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31002.00 =    542.00 FEET.

 *************************************************************************
   FLOW PROCESS FROM NODE  31002.00 TO NODE  31003.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   430.00  DOWNSTREAM(FEET) =    422.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  159.00   CHANNEL SLOPE = 0.0503
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.600
   SUBAREA LOSS RATE DATA(AMC  II):
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```
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
     LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED              -         1.34      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) =       6.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.03
  AVERAGE FLOW DEPTH(FEET) =  0.72   TRAVEL TIME(MIN.) =   0.66
  Tc(MIN.) =  10.88
  SUBAREA AREA(ACRES) =     1.34       SUBAREA RUNOFF(CFS) =    2.78
  EFFECTIVE AREA(ACRES) =      3.61    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) =       7.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.77   FLOW VELOCITY(FEET/SEC.) =  4.24
  LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31003.00 =     701.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31003.00 TO NODE  31004.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    422.00  DOWNSTREAM(FEET) =    379.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   506.00   CHANNEL SLOPE = 0.0850
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.448
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED              -         2.88      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) =      10.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.99
  AVERAGE FLOW DEPTH(FEET) =  0.70   TRAVEL TIME(MIN.) =   1.21
  Tc(MIN.) =  12.09
  SUBAREA AREA(ACRES) =     2.88       SUBAREA RUNOFF(CFS) =    5.56
  EFFECTIVE AREA(ACRES) =      6.48    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) =      12.53

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.76   FLOW VELOCITY(FEET/SEC.) =  7.27
  LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31004.00 =    1207.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31004.00 TO NODE  31005.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =    365.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   357.00   CHANNEL SLOPE = 0.0392
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
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  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.334
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED              -         2.59      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) =      14.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.70
  AVERAGE FLOW DEPTH(FEET) =  0.93   TRAVEL TIME(MIN.) =   1.04
  Tc(MIN.) =  13.13
  SUBAREA AREA(ACRES) =     2.59       SUBAREA RUNOFF(CFS) =    4.74
  EFFECTIVE AREA(ACRES) =      9.07    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         9.1      PEAK FLOW RATE(CFS) =      16.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.97   FLOW VELOCITY(FEET/SEC.) =  5.86
  LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31005.00 =    1564.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31005.00 TO NODE  31006.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    365.00  DOWNSTREAM(FEET) =    334.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   696.00   CHANNEL SLOPE = 0.0445
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.171
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED              -         5.86      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) =      21.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.54
  AVERAGE FLOW DEPTH(FEET) =  1.05   TRAVEL TIME(MIN.) =   1.77
  Tc(MIN.) =  14.91
  SUBAREA AREA(ACRES) =     5.86       SUBAREA RUNOFF(CFS) =    9.87
  EFFECTIVE AREA(ACRES) =     14.93    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        14.9      PEAK FLOW RATE(CFS) =      25.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.11   FLOW VELOCITY(FEET/SEC.) =  6.81
  LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31006.00 =    2260.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31006.00 TO NODE  31007.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    334.00  DOWNSTREAM(FEET) =    327.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   175.00   CHANNEL SLOPE = 0.0400
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CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.140
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED             -        33.75     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) =      53.09
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.88
AVERAGE FLOW DEPTH(FEET) =   1.50   TRAVEL TIME(MIN.) =   0.37
Tc(MIN.) =   15.28
SUBAREA AREA(ACRES) =     33.75      SUBAREA RUNOFF(CFS) =   55.90
EFFECTIVE AREA(ACRES) =     48.68     AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =       48.7        PEAK FLOW RATE(CFS) =      80.64

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.75   FLOW VELOCITY(FEET/SEC.) =   8.76
LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31007.00 =    2435.00 FEET.
=============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =        48.7  TC(MIN.) =       15.28
EFFECTIVE AREA(ACRES) =      48.68  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)    =        80.64
=============================================================================
=============================================================================
END OF RATIONAL METHOD ANALYSIS
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**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                          Analysis prepared by:

                       Michael Baker International
                     5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 11 EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 25-YR EV MARCH 2019 CCHIU                                            *
 **********************************************************************

   FILE NAME: X31125EV.DAT
   TIME/DATE OF STUDY: 10:28 03/25/2019
 ===========================================================================
   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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31100.00 TO NODE  31101.00 IS CODE =  21
 --------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ===========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
   ELEVATION DATA: UPSTREAM(FEET) =    532.00  DOWNSTREAM(FEET) =    475.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.054
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.720
   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"              -        0.34     0.30     1.000     0  10.05
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.75
   TOTAL AREA(ACRES) =       0.34    PEAK FLOW RATE(CFS) =       0.75

 **************************************************************************
   FLOW PROCESS FROM NODE  31101.00 TO NODE  31102.00 IS CODE =  51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    475.00  DOWNSTREAM(FEET) =    455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   133.00    CHANNEL SLOPE = 0.1504
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.641
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap    SCS
        LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
   USER-DEFINED              -        0.47     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) =     1.25
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.13
   AVERAGE FLOW DEPTH(FEET) =   0.32    TRAVEL TIME(MIN.) =   0.54
   Tc(MIN.) =   10.59
   SUBAREA AREA(ACRES) =      0.47     SUBAREA RUNOFF(CFS) =    1.00
   EFFECTIVE AREA(ACRES) =       0.82     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         0.8        PEAK FLOW RATE(CFS) =      1.73

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.36   FLOW VELOCITY(FEET/SEC.) =   4.40
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31102.00 =    455.00 FEET.

 **************************************************************************
   FLOW PROCESS FROM NODE  31102.00 TO NODE  31103.00 IS CODE =  51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    415.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   238.00    CHANNEL SLOPE = 0.1681
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.533
   SUBAREA LOSS RATE DATA(AMC  II):
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```
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE           GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -         0.58     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) =     2.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.96
  AVERAGE FLOW DEPTH(FEET) =  0.39   TRAVEL TIME(MIN.) =  0.80
  Tc(MIN.) =  11.39
  SUBAREA AREA(ACRES) =     0.58      SUBAREA RUNOFF(CFS) =   1.17
  EFFECTIVE AREA(ACRES) =     1.40    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =      2.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   FLOW VELOCITY(FEET/SEC.) =  5.21
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31103.00 =    693.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31103.00 TO NODE  31104.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    415.00  DOWNSTREAM(FEET) =    379.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   394.00   CHANNEL SLOPE = 0.0914
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.398
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE           GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -         1.61     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) =     4.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.77
  AVERAGE FLOW DEPTH(FEET) =  0.50   TRAVEL TIME(MIN.) =  1.14
  Tc(MIN.) =  12.53
  SUBAREA AREA(ACRES) =     1.61      SUBAREA RUNOFF(CFS) =   3.05
  EFFECTIVE AREA(ACRES) =     3.01    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) =      5.69

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.55   FLOW VELOCITY(FEET/SEC.) =  6.18
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31104.00 =   1087.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31104.00 TO NODE  31105.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =    359.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE = 0.0515
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
```

```
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.283
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE           GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -         5.30     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) =    10.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.78
  AVERAGE FLOW DEPTH(FEET) =  0.78   TRAVEL TIME(MIN.) =  1.12
  Tc(MIN.) =  13.65
  SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =   9.45
  EFFECTIVE AREA(ACRES) =     8.31    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =     14.83

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.89   FLOW VELOCITY(FEET/SEC.) =  6.27
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31105.00 =   1475.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31105.00 TO NODE  31106.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    359.00  DOWNSTREAM(FEET) =    345.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   316.00   CHANNEL SLOPE = 0.0443
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.205
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE           GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -         2.41     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) =    16.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.16
  AVERAGE FLOW DEPTH(FEET) =  0.96   TRAVEL TIME(MIN.) =  0.86
  Tc(MIN.) =  14.50
  SUBAREA AREA(ACRES) =     2.41      SUBAREA RUNOFF(CFS) =   4.14
  EFFECTIVE AREA(ACRES) =    10.72    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.7       PEAK FLOW RATE(CFS) =     18.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.99   FLOW VELOCITY(FEET/SEC.) =  6.29
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31106.00 =   1791.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31106.00 TO NODE  31107.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    345.00  DOWNSTREAM(FEET) =    336.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE = 0.0265
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.124
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -        11.64     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) =     27.94
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.76
   AVERAGE FLOW DEPTH(FEET) =  1.27   TRAVEL TIME(MIN.) =   0.98
   Tc(MIN.) =  15.49
   SUBAREA AREA(ACRES) =    11.64      SUBAREA RUNOFF(CFS) =  19.10
   EFFECTIVE AREA(ACRES) =    22.36     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      22.4          PEAK FLOW RATE(CFS) =     36.70

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.41   FLOW VELOCITY(FEET/SEC.) =  6.17
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31107.00 =   2131.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31107.00 TO NODE  31108.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    336.00  DOWNSTREAM(FEET) =   325.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   488.00   CHANNEL SLOPE = 0.0225
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.024
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -         5.13     0.30      0.939     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.939
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     40.72
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.97
   AVERAGE FLOW DEPTH(FEET) =  1.51   TRAVEL TIME(MIN.) =   1.36
   Tc(MIN.) =  16.85
   SUBAREA AREA(ACRES) =     5.13      SUBAREA RUNOFF(CFS) =   8.04
   EFFECTIVE AREA(ACRES) =    27.49     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  0.99
   TOTAL AREA(ACRES) =      27.5          PEAK FLOW RATE(CFS) =     42.73

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.54   FLOW VELOCITY(FEET/SEC.) =  6.02
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31108.00 =   2619.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31108.00 TO NODE  31109.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    325.00 DOWNSTREAM(FEET) =   275.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   731.00   CHANNEL SLOPE = 0.0684
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.922
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -        10.26     0.30      0.934     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.934
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     50.31
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.68
   AVERAGE FLOW DEPTH(FEET) =  1.48   TRAVEL TIME(MIN.) =   1.59
   Tc(MIN.) =  18.43
   SUBAREA AREA(ACRES) =    10.26      SUBAREA RUNOFF(CFS) =  15.16
   EFFECTIVE AREA(ACRES) =    37.75     AREA-AVERAGED Fm(INCH/HR) =  0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  0.97
   TOTAL AREA(ACRES) =      37.7          PEAK FLOW RATE(CFS) =     55.38

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.53   FLOW VELOCITY(FEET/SEC.) =  7.88
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31109.00 =   3350.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31109.00 TO NODE  31110.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    275.00 DOWNSTREAM(FEET) =   261.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   641.00   CHANNEL SLOPE = 0.0218
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.812
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -        15.10     0.30      0.985     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.985
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     65.68
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.34
   AVERAGE FLOW DEPTH(FEET) =  2.02   TRAVEL TIME(MIN.) =   2.00
   Tc(MIN.) =  20.43
   SUBAREA AREA(ACRES) =    15.10      SUBAREA RUNOFF(CFS) =  20.61
   EFFECTIVE AREA(ACRES) =    52.85     AREA-AVERAGED Fm(INCH/HR) =  0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  0.98
   TOTAL AREA(ACRES) =      52.8          PEAK FLOW RATE(CFS) =     72.24

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.10   FLOW VELOCITY(FEET/SEC.) =  5.49
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31110.00 =   3991.00 FEET.
==========================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =       52.8  TC(MIN.) =     20.43
EFFECTIVE AREA(ACRES) =      52.85  AREA-AVERAGED Fm(INCH/HR)=  0.29
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.977
```

```
  PEAK FLOW RATE(CFS)   =      72.24
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
*********************************************************************
        RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
        (c) Copyright 1983-2013 Advanced Engineering Software (aes)
           Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                     Analysis prepared by:

                   Michael Baker International
                  5 Hutton Centre Drive Suite 500
                       Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 12 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 25-YR EV MARCH 2019 CCHIU                                           *
  **********************************************************************

  FILE NAME: X31225EV.DAT
  TIME/DATE OF STUDY: 10:29 03/25/2019
 ====================================================================
  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  60.0     30.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31200.00 TO NODE  31201.00 IS CODE = 21
 -------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ===================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
  ELEVATION DATA: UPSTREAM(FEET) =   761.00  DOWNSTREAM(FEET) =   639.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.619
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.972
  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"             -         0.91      0.30     1.000    0   8.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.19
  TOTAL AREA(ACRES) =      0.91   PEAK FLOW RATE(CFS) =      2.19

 *******************************************************************************
  FLOW PROCESS FROM NODE  31201.00 TO NODE  31202.00 IS CODE = 51
 -------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   639.00  DOWNSTREAM(FEET) =   595.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE = 0.2009
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.856
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap     SCS
        LAND USE         GROUP     (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED             -         0.97      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) =     3.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.89
  AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   0.62
  Tc(MIN.) =   9.24
  SUBAREA AREA(ACRES) =     0.97      SUBAREA RUNOFF(CFS) =     2.22
  EFFECTIVE AREA(ACRES) =      1.88      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.9        PEAK FLOW RATE(CFS) =     4.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   FLOW VELOCITY(FEET/SEC.) =   6.15
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31202.00 =    540.00 FEET.

 *******************************************************************************
  FLOW PROCESS FROM NODE  31202.00 TO NODE  31203.00 IS CODE = 51
 -------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   595.00  DOWNSTREAM(FEET) =   589.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE = 0.1200
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.830
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        2.51     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) =      7.17
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.77
 AVERAGE FLOW DEPTH(FEET) = 0.64  TRAVEL TIME(MIN.) =  0.14
 Tc(MIN.) =  9.38
 SUBAREA AREA(ACRES) =    2.51      SUBAREA RUNOFF(CFS) =   5.71
 EFFECTIVE AREA(ACRES) =    4.38   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       4.4      PEAK FLOW RATE(CFS) =      9.98

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.73  FLOW VELOCITY(FEET/SEC.) =  6.29
 LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31203.00 =    590.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE  31203.00 TO NODE  31204.00 IS CODE =  51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    589.00  DOWNSTREAM(FEET) =    560.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  308.00  CHANNEL SLOPE = 0.0942
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.699
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE         GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        4.19     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) =     14.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.32
 AVERAGE FLOW DEPTH(FEET) = 0.87  TRAVEL TIME(MIN.) =  0.81
 Tc(MIN.) = 10.19
 SUBAREA AREA(ACRES) =    4.19      SUBAREA RUNOFF(CFS) =   9.05
 EFFECTIVE AREA(ACRES) =    8.57   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) =     18.51

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.96  FLOW VELOCITY(FEET/SEC.) =  6.74
 LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31204.00 =    898.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE  31204.00 TO NODE  31205.00 IS CODE =  51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    560.00  DOWNSTREAM(FEET) =    537.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  457.00  CHANNEL SLOPE = 0.0503
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
```

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 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.519
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE         GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        8.19     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) =     26.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.85
 AVERAGE FLOW DEPTH(FEET) = 1.23  TRAVEL TIME(MIN.) =  1.30
 Tc(MIN.) = 11.50
 SUBAREA AREA(ACRES) =    8.19      SUBAREA RUNOFF(CFS) =  16.36
 EFFECTIVE AREA(ACRES) =   16.76   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      16.8      PEAK FLOW RATE(CFS) =     33.49

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.35  FLOW VELOCITY(FEET/SEC.) =  6.16
 LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31205.00 =   1355.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE  31205.00 TO NODE  31206.00 IS CODE =  51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    537.00  DOWNSTREAM(FEET) =    479.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  780.00  CHANNEL SLOPE = 0.0744
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 * 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
 USER-DEFINED             -       15.47     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) =     47.64
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.83
 AVERAGE FLOW DEPTH(FEET) = 1.42  TRAVEL TIME(MIN.) =  1.66
 Tc(MIN.) = 13.16
 SUBAREA AREA(ACRES) =   15.47      SUBAREA RUNOFF(CFS) =  28.30
 EFFECTIVE AREA(ACRES) =   32.24   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      32.2      PEAK FLOW RATE(CFS) =     58.96

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.54  FLOW VELOCITY(FEET/SEC.) =  8.24
 LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31206.00 =   2135.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE  31206.00 TO NODE  31207.00 IS CODE =  51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    479.00  DOWNSTREAM(FEET) =    455.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  551.00  CHANNEL SLOPE = 0.0436
```

```
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.216
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
         LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
     USER-DEFINED             -        37.81      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) =      91.57
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.50
    AVERAGE FLOW DEPTH(FEET) = 2.02    TRAVEL TIME(MIN.) =   1.22
    Tc(MIN.) =   14.38
    SUBAREA AREA(ACRES) =    37.81       SUBAREA RUNOFF(CFS) =   65.21
    EFFECTIVE AREA(ACRES) =     70.05       AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =        70.1            PEAK FLOW RATE(CFS) =      120.80

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 2.23   FLOW VELOCITY(FEET/SEC.) =   8.08
    LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31207.00 =   2686.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31207.00 TO NODE  31208.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =     434.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   743.00   CHANNEL SLOPE = 0.0283
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.074
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
         LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
     USER-DEFINED             -        18.18      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) =     135.33
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.05
    AVERAGE FLOW DEPTH(FEET) = 2.53    TRAVEL TIME(MIN.) =   1.76
    Tc(MIN.) =   16.14
    SUBAREA AREA(ACRES) =    18.18       SUBAREA RUNOFF(CFS) =   29.04
    EFFECTIVE AREA(ACRES) =     88.23       AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =        88.2            PEAK FLOW RATE(CFS) =      140.91

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 2.57   FLOW VELOCITY(FEET/SEC.) =   7.12
    LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31208.00 =   3429.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31208.00 TO NODE  31209.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
```

```
    ELEVATION DATA: UPSTREAM(FEET) =    434.00  DOWNSTREAM(FEET) =     410.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   899.00   CHANNEL SLOPE = 0.0267
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.937
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
         LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
     USER-DEFINED             -        42.09      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) =     171.93
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.33
    AVERAGE FLOW DEPTH(FEET) = 2.80    TRAVEL TIME(MIN.) =   2.05
    Tc(MIN.) =   18.18
    SUBAREA AREA(ACRES) =    42.09       SUBAREA RUNOFF(CFS) =   62.02
    EFFECTIVE AREA(ACRES) =    130.32       AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =       130.3            PEAK FLOW RATE(CFS) =      192.05

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 2.92   FLOW VELOCITY(FEET/SEC.) =   7.52
    LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31209.00 =   4328.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31209.00 TO NODE  31210.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =     390.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   724.00   CHANNEL SLOPE = 0.0276
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.849
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
         LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
     USER-DEFINED             -        27.15      0.30     0.999      -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.999
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     210.98
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.81
    AVERAGE FLOW DEPTH(FEET) = 3.00    TRAVEL TIME(MIN.) =   1.55
    Tc(MIN.) =   19.73
    SUBAREA AREA(ACRES) =    27.15       SUBAREA RUNOFF(CFS) =   37.86
    EFFECTIVE AREA(ACRES) =    157.48       AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =       157.5            PEAK FLOW RATE(CFS) =      219.53

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 3.05   FLOW VELOCITY(FEET/SEC.) =   7.88
    LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31210.00 =   5052.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31210.00 TO NODE  31211.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     390.00  DOWNSTREAM(FEET) =     364.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1073.00   CHANNEL SLOPE = 0.0242
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.733
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        15.95     0.30      0.963     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.963
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     229.90
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.59
   AVERAGE FLOW DEPTH(FEET) = 3.18   TRAVEL TIME(MIN.) =   2.35
   Tc(MIN.) =  22.08
   SUBAREA AREA(ACRES) =    15.95       SUBAREA RUNOFF(CFS) =   20.74
   EFFECTIVE AREA(ACRES) =    173.43     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      173.4       PEAK FLOW RATE(CFS) =     223.87

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.15   FLOW VELOCITY(FEET/SEC.) =  7.54
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31211.00 =   6125.00 FEET.

*********************************************************************************
   FLOW PROCESS FROM NODE  31211.00 TO NODE  31212.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    364.00  DOWNSTREAM(FEET) =     318.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1175.00   CHANNEL SLOPE = 0.0391
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.647
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        81.12     0.30      0.928     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.928
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     273.83
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.50
   AVERAGE FLOW DEPTH(FEET) = 3.10   TRAVEL TIME(MIN.) =   2.06
   Tc(MIN.) =  24.15
   SUBAREA AREA(ACRES) =    81.12       SUBAREA RUNOFF(CFS) =   99.90
   EFFECTIVE AREA(ACRES) =    254.55     AREA-AVERAGED Fm(INCH/HR) =   0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.97
   TOTAL AREA(ACRES) =      254.5       PEAK FLOW RATE(CFS) =     310.28

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.25   FLOW VELOCITY(FEET/SEC.) =  9.81
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31212.00 =   7300.00 FEET.

*********************************************************************************
   FLOW PROCESS FROM NODE  31212.00 TO NODE  31213.00 IS CODE = 51
```

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-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    318.00  DOWNSTREAM(FEET) =     317.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  506.00   CHANNEL SLOPE = 0.0020
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.553
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -         1.00     0.30      0.850     -
   USER-DEFINED               -        28.30     0.30      1.000     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.995
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     326.82
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.24
   AVERAGE FLOW DEPTH(FEET) = 5.80   TRAVEL TIME(MIN.) =   2.60
   Tc(MIN.) =  26.75
   SUBAREA AREA(ACRES) =    29.30       SUBAREA RUNOFF(CFS) =   33.08
   EFFECTIVE AREA(ACRES) =    283.85     AREA-AVERAGED Fm(INCH/HR) =   0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.98
   TOTAL AREA(ACRES) =      283.8       PEAK FLOW RATE(CFS) =     321.89

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 5.76   FLOW VELOCITY(FEET/SEC.) =  3.23
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31213.00 =   7806.00 FEET.
=================================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =      283.8  TC(MIN.) =    26.75
   EFFECTIVE AREA(ACRES) =    283.85  AREA-AVERAGED Fm(INCH/HR)= 0.29
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.977
   PEAK FLOW RATE(CFS)    =      321.89
=================================================================================

=================================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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

                     Michael Baker International
                    5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
* RMV PA-3 WATERSHED 13 EXISTING CONDITION                            *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
* 25-YR EV MARCH 2019 CCHIU                                           *
 *********************************************************************

  FILE NAME: X31325EV.DAT
  TIME/DATE OF STUDY: 10:29 03/25/2019
=========================================================================
  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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth =  0.00 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  31300.00 TO NODE  31301.00 IS CODE =  21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    316.00
  ELEVATION DATA: UPSTREAM(FEET) =    535.00  DOWNSTREAM(FEET) =     490.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.423
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.665
  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
  "GRASS"                  -        0.53     0.30     1.000     0  10.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.12
  TOTAL AREA(ACRES) =       0.53   PEAK FLOW RATE(CFS) =       1.12

*************************************************************************
  FLOW PROCESS FROM NODE  31301.00 TO NODE  31302.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    480.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00   CHANNEL SLOPE = 0.0746
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.578
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap     SCS
       LAND USE          GROUP     (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED             -        1.00     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) =     2.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.61
  AVERAGE FLOW DEPTH(FEET) =   0.45   TRAVEL TIME(MIN.) =   0.62
  Tc(MIN.) =   11.04
  SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    2.05
  EFFECTIVE AREA(ACRES) =      1.53     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       3.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.51   FLOW VELOCITY(FEET/SEC.) =   3.96
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31302.00 =      450.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31302.00 TO NODE  31303.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    480.00  DOWNSTREAM(FEET) =    469.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   237.00   CHANNEL SLOPE = 0.0464
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.445
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
 USER-DEFINED             -         1.63      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) =      4.71
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.68
 AVERAGE FLOW DEPTH(FEET) =  0.65   TRAVEL TIME(MIN.) =   1.07
 Tc(MIN.) =   12.11
 SUBAREA AREA(ACRES) =     1.63      SUBAREA RUNOFF(CFS) =    3.15
 EFFECTIVE AREA(ACRES) =     3.16    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) =      6.10

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.72   FLOW VELOCITY(FEET/SEC.) =  3.90
 LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31303.00 =    687.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31303.00 TO NODE  31304.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    469.00  DOWNSTREAM(FEET) =    418.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    483.00   CHANNEL SLOPE = 0.1056
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.299
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
 USER-DEFINED             -         3.16      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) =      8.95
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.85
 AVERAGE FLOW DEPTH(FEET) =  0.71   TRAVEL TIME(MIN.) =   1.38
 Tc(MIN.) =   13.49
 SUBAREA AREA(ACRES) =     3.16      SUBAREA RUNOFF(CFS) =    5.69
 EFFECTIVE AREA(ACRES) =     6.32    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       6.3       PEAK FLOW RATE(CFS) =     11.38

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.78   FLOW VELOCITY(FEET/SEC.) =  6.22
 LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31304.00 =   1170.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31304.00 TO NODE  31305.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    418.00  DOWNSTREAM(FEET) =    381.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    469.00   CHANNEL SLOPE = 0.0789
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
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 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.188
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
 USER-DEFINED             -        10.56      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) =     20.35
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.45
 AVERAGE FLOW DEPTH(FEET) =  1.03   TRAVEL TIME(MIN.) =   1.21
 Tc(MIN.) =   14.70
 SUBAREA AREA(ACRES) =    10.56      SUBAREA RUNOFF(CFS) =   17.95
 EFFECTIVE AREA(ACRES) =    16.88    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      16.9       PEAK FLOW RATE(CFS) =     28.69

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.16   FLOW VELOCITY(FEET/SEC.) =  7.05
 LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31305.00 =   1639.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31305.00 TO NODE  31306.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    381.00  DOWNSTREAM(FEET) =    363.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    398.00   CHANNEL SLOPE = 0.0452
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030  MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.120
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
 USER-DEFINED             -        19.15      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) =     44.38
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.90
 AVERAGE FLOW DEPTH(FEET) =  1.37   TRAVEL TIME(MIN.) =   0.84
 Tc(MIN.) =   15.54
 SUBAREA AREA(ACRES) =    19.15      SUBAREA RUNOFF(CFS) =   31.36
 EFFECTIVE AREA(ACRES) =    36.03    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      36.0       PEAK FLOW RATE(CFS) =     59.01

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.52   FLOW VELOCITY(FEET/SEC.) =  8.48
 LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31306.00 =   2037.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31306.00 TO NODE  31307.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    363.00  DOWNSTREAM(FEET) =    313.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    836.00   CHANNEL SLOPE = 0.0598
```

```
    CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.016
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED               -        13.40     0.30     0.998      -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.998
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      69.37
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.80
    AVERAGE FLOW DEPTH(FEET) =  1.54    TRAVEL TIME(MIN.) =  1.42
    Tc(MIN.) =   16.96
    SUBAREA AREA(ACRES) =    13.40       SUBAREA RUNOFF(CFS) =   20.70
    EFFECTIVE AREA(ACRES) =     49.43      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =      49.4         PEAK FLOW RATE(CFS) =      76.35

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.59   FLOW VELOCITY(FEET/SEC.) = 10.04
    LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31307.00 =   2873.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31307.00 TO NODE  31308.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    313.00  DOWNSTREAM(FEET) =    302.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  763.00   CHANNEL SLOPE = 0.0144
    CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.885
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED               -        11.99     0.30     0.998      -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.998
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      84.91
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.06
    AVERAGE FLOW DEPTH(FEET) =  2.16    TRAVEL TIME(MIN.) =  2.10
    Tc(MIN.) =   19.06
    SUBAREA AREA(ACRES) =    11.99       SUBAREA RUNOFF(CFS) =   17.12
    EFFECTIVE AREA(ACRES) =     61.43      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =      61.4         PEAK FLOW RATE(CFS) =      87.67

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  2.19   FLOW VELOCITY(FEET/SEC.) =  6.11
    LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31308.00 =   3636.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31308.00 TO NODE  31309.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
```

```
    ELEVATION DATA: UPSTREAM(FEET) =    302.00  DOWNSTREAM(FEET) =    289.00
    CHANNEL LENGTH THRU SUBAREA(FEET) = 1009.00   CHANNEL SLOPE = 0.0129
    CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.745
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED               -        21.83     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) =     101.86
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.08
    AVERAGE FLOW DEPTH(FEET) =  2.36    TRAVEL TIME(MIN.) =  2.76
    Tc(MIN.) =   21.83
    SUBAREA AREA(ACRES) =    21.83       SUBAREA RUNOFF(CFS) =   28.38
    EFFECTIVE AREA(ACRES) =     83.25      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =      83.3         PEAK FLOW RATE(CFS) =     108.27

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  2.42   FLOW VELOCITY(FEET/SEC.) =  6.16
    LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31309.00 =   4645.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31309.00 TO NODE  31310.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    289.00  DOWNSTREAM(FEET) =    275.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  628.00   CHANNEL SLOPE = 0.0223
    CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.687
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
    USER-DEFINED               -        37.10     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) =     131.43
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.95
    AVERAGE FLOW DEPTH(FEET) =  2.35    TRAVEL TIME(MIN.) =  1.32
    Tc(MIN.) =   23.14
    SUBAREA AREA(ACRES) =    37.10       SUBAREA RUNOFF(CFS) =   46.32
    EFFECTIVE AREA(ACRES) =    120.35      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =     120.4         PEAK FLOW RATE(CFS) =     150.28

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  2.47   FLOW VELOCITY(FEET/SEC.) =  8.22
    LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31310.00 =   5273.00 FEET.
=========================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)       =      120.4  TC(MIN.) =      23.14
EFFECTIVE AREA(ACRES) =     120.35  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
```

```
  PEAK FLOW RATE(CFS)   =    150.28
================================================================================
================================================================================
  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 **************************
* RMV PA-3 WATERSHED 14 EXISTING CONDITION   *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL   *
* 25-YR EV MARCH 2019 CCHIU   *
 ****

 FILE NAME: X31425EV.DAT
 TIME/DATE OF STUDY: 10:30 03/25/2019
==
 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 60.0   30.0   0.020/0.020/0.020 0.67   2.00 0.0313 0.167 0.0150
 2 50.0   25.0   0.020/0.020/0.020 0.67   2.00 0.0313 0.167 0.0150
 3 40.0   20.0   0.020/0.020/0.020 0.67   2.00 0.0313 0.167 0.0150
 4 30.0   15.0   0.020/0.020/0.020 0.67   2.00 0.0313 0.167 0.0150
 5 20.0   10.0   0.020/0.020/0.020 0.67   2.00 0.0313 0.167 0.0150

 GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth = 0.00 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 31400.00 TO NODE 31401.00 IS CODE = 21

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==

 INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
 ELEVATION DATA: UPSTREAM(FEET) =   868.00 DOWNSTREAM(FEET) =   772.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.143
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.873
 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
 "CHAPARRAL,NARROWLEAF"   -   0.99   0.30   1.000   0   9.14
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) =   2.29
 TOTAL AREA(ACRES) =   0.99   PEAK FLOW RATE(CFS) =   2.29

****
 FLOW PROCESS FROM NODE 31401.00 TO NODE 31402.00 IS CODE = 51

 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==
 ELEVATION DATA: UPSTREAM(FEET) =   772.00 DOWNSTREAM(FEET) =   750.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 134.00   CHANNEL SLOPE = 0.1642
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.802
 SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
      LAND USE   GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
 USER-DEFINED   -   1.23   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) =   3.67
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.54
 AVERAGE FLOW DEPTH(FEET) =   0.47   TRAVEL TIME(MIN.) =   0.40
 Tc(MIN.) =   9.55
 SUBAREA AREA(ACRES) =   1.23   SUBAREA RUNOFF(CFS) =   2.76
 EFFECTIVE AREA(ACRES) =   2.21   AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =   2.2   PEAK FLOW RATE(CFS) =   4.99

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.53   FLOW VELOCITY(FEET/SEC.) =   5.94
 LONGEST FLOWPATH FROM NODE 31400.00 TO NODE 31402.00 =   461.00 FEET.

****
 FLOW PROCESS FROM NODE 31402.00 TO NODE 31403.00 IS CODE = 51

 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==
 ELEVATION DATA: UPSTREAM(FEET) =   750.00 DOWNSTREAM(FEET) =   710.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 318.00   CHANNEL SLOPE = 0.1258
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.659
 SUBAREA LOSS RATE DATA(AMC II):

```
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        1.42     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) =      6.50
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.76
 AVERAGE FLOW DEPTH(FEET) =  0.61   TRAVEL TIME(MIN.) =  0.92
 Tc(MIN.) =  10.47
 SUBAREA AREA(ACRES) =     1.42      SUBAREA RUNOFF(CFS) =    3.02
 EFFECTIVE AREA(ACRES) =      3.64    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) =      7.72

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.65   FLOW VELOCITY(FEET/SEC.) =  6.03
 LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31403.00 =    779.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31403.00 TO NODE  31404.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    710.00  DOWNSTREAM(FEET) =    688.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  181.00   CHANNEL SLOPE = 0.1215
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 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             -        1.91     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) =      9.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.33
 AVERAGE FLOW DEPTH(FEET) =  0.71   TRAVEL TIME(MIN.) =  0.48
 Tc(MIN.) =  10.94
 SUBAREA AREA(ACRES) =     1.91      SUBAREA RUNOFF(CFS) =    3.94
 EFFECTIVE AREA(ACRES) =      5.55    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        5.5       PEAK FLOW RATE(CFS) =     11.44

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.76   FLOW VELOCITY(FEET/SEC.) =  6.60
 LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31404.00 =    960.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31404.00 TO NODE  31405.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    688.00  DOWNSTREAM(FEET) =    675.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  237.00   CHANNEL SLOPE = 0.0549
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
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 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.492
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        2.67     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) =     14.07
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.13
 AVERAGE FLOW DEPTH(FEET) =  0.96   TRAVEL TIME(MIN.) =  0.77
 Tc(MIN.) =  11.71
 SUBAREA AREA(ACRES) =     2.67      SUBAREA RUNOFF(CFS) =    5.27
 EFFECTIVE AREA(ACRES) =      8.21    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =     16.21

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.01   FLOW VELOCITY(FEET/SEC.) =  5.30
 LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31405.00 =   1197.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31405.00 TO NODE  31406.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   675.00  DOWNSTREAM(FEET) =    668.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   78.00   CHANNEL SLOPE = 0.0897
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.470
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        7.51     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) =     23.55
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.02
 AVERAGE FLOW DEPTH(FEET) =  1.06   TRAVEL TIME(MIN.) =  0.19
 Tc(MIN.) =  11.90
 SUBAREA AREA(ACRES) =     7.51      SUBAREA RUNOFF(CFS) =   14.68
 EFFECTIVE AREA(ACRES) =     15.73    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       15.7       PEAK FLOW RATE(CFS) =      30.72

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.17   FLOW VELOCITY(FEET/SEC.) =  7.48
 LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31406.00 =   1275.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31406.00 TO NODE  31407.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   668.00  DOWNSTREAM(FEET) =    640.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  558.00   CHANNEL SLOPE = 0.0502
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   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.313
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp        Ap      SCS
        LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED                 -        9.79       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) =      39.60
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.44
   AVERAGE FLOW DEPTH(FEET) =  1.43    TRAVEL TIME(MIN.) =   1.44
   Tc(MIN.) =   13.34
   SUBAREA AREA(ACRES) =      9.79       SUBAREA RUNOFF(CFS) =   17.74
   EFFECTIVE AREA(ACRES) =      25.52      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      25.5          PEAK FLOW RATE(CFS) =      46.24

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.52   FLOW VELOCITY(FEET/SEC.) =   6.66
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31407.00 =    1833.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31407.00 TO NODE  31408.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    607.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    710.00   CHANNEL SLOPE = 0.0465
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.160
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp        Ap      SCS
        LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED                 -       18.46       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) =      61.69
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.00
   AVERAGE FLOW DEPTH(FEET) =  1.71    TRAVEL TIME(MIN.) =   1.69
   Tc(MIN.) =   15.03
   SUBAREA AREA(ACRES) =     18.46       SUBAREA RUNOFF(CFS) =   30.90
   EFFECTIVE AREA(ACRES) =      43.97      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      44.0          PEAK FLOW RATE(CFS) =      73.63

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.83   FLOW VELOCITY(FEET/SEC.) =   7.30
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31408.00 =    2543.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31408.00 TO NODE  31409.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
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```
   ELEVATION DATA: UPSTREAM(FEET) =    607.00  DOWNSTREAM(FEET) =    574.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    674.00   CHANNEL SLOPE = 0.0490
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.048
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp        Ap      SCS
        LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED                 -        9.15       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) =      80.83
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.61
   AVERAGE FLOW DEPTH(FEET) =  1.88    TRAVEL TIME(MIN.) =   1.48
   Tc(MIN.) =   16.51
   SUBAREA AREA(ACRES) =      9.15       SUBAREA RUNOFF(CFS) =   14.40
   EFFECTIVE AREA(ACRES) =      53.13      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      53.1          PEAK FLOW RATE(CFS) =      83.56

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.90   FLOW VELOCITY(FEET/SEC.) =   7.68
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31409.00 =    3217.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31409.00 TO NODE  31410.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =    540.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    817.00   CHANNEL SLOPE = 0.0416
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 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                 -       54.88       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) =     123.97
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.97
   AVERAGE FLOW DEPTH(FEET) =  2.28    TRAVEL TIME(MIN.) =   1.71
   Tc(MIN.) =   18.22
   SUBAREA AREA(ACRES) =     54.88       SUBAREA RUNOFF(CFS) =   80.77
   EFFECTIVE AREA(ACRES) =     108.01      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =     108.0          PEAK FLOW RATE(CFS) =     158.96

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.50   FLOW VELOCITY(FEET/SEC.) =   8.49
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31410.00 =    4034.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31410.00 TO NODE  31411.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
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```
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1364.00   CHANNEL SLOPE = 0.0293
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.776
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED              -       40.22     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) =    185.70
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.74
  AVERAGE FLOW DEPTH(FEET) =  2.83   TRAVEL TIME(MIN.) =   2.94
  Tc(MIN.) =   21.15
  SUBAREA AREA(ACRES) =    40.22       SUBAREA RUNOFF(CFS) =   53.44
  EFFECTIVE AREA(ACRES) =    148.22     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      148.2        PEAK FLOW RATE(CFS) =    196.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 2.89   FLOW VELOCITY(FEET/SEC.) =   7.87
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31411.00 =    5398.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31411.00 TO NODE  31412.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    468.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  985.00   CHANNEL SLOPE = 0.0325
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.692
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED              -      100.09     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) =    259.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.74
  AVERAGE FLOW DEPTH(FEET) =  3.15   TRAVEL TIME(MIN.) =   1.88
  Tc(MIN.) =   23.03
  SUBAREA AREA(ACRES) =   100.09       SUBAREA RUNOFF(CFS) =  125.39
  EFFECTIVE AREA(ACRES) =    248.31     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      248.3        PEAK FLOW RATE(CFS) =    311.09

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 3.37   FLOW VELOCITY(FEET/SEC.) =   9.14
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31412.00 =    6383.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31412.00 TO NODE  31413.00 IS CODE = 51
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--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    468.00  DOWNSTREAM(FEET) =    428.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1135.00   CHANNEL SLOPE = 0.0352
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.615
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED              -       56.18     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) =    344.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.68
  AVERAGE FLOW DEPTH(FEET) =  3.44   TRAVEL TIME(MIN.) =   1.95
  Tc(MIN.) =   24.98
  SUBAREA AREA(ACRES) =    56.18       SUBAREA RUNOFF(CFS) =   66.48
  EFFECTIVE AREA(ACRES) =    304.49     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      304.5        PEAK FLOW RATE(CFS) =    360.33

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 3.50   FLOW VELOCITY(FEET/SEC.) =   9.78
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31413.00 =    7518.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31413.00 TO NODE  31414.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    428.00  DOWNSTREAM(FEET) =    394.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  888.00   CHANNEL SLOPE = 0.0383
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.564
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED              -       35.49     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) =    380.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.24
  AVERAGE FLOW DEPTH(FEET) =  3.52   TRAVEL TIME(MIN.) =   1.45
  Tc(MIN.) =   26.43
  SUBAREA AREA(ACRES) =    35.49       SUBAREA RUNOFF(CFS) =   40.36
  EFFECTIVE AREA(ACRES) =    339.98     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      340.0        PEAK FLOW RATE(CFS) =    386.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 3.54   FLOW VELOCITY(FEET/SEC.) =  10.27
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31414.00 =    8406.00 FEET.
```

```
*************************************************************************
  FLOW PROCESS FROM NODE  31414.00 TO NODE  31415.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    394.00  DOWNSTREAM(FEET) =    368.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1044.00   CHANNEL SLOPE = 0.0249
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.500
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap     SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        26.50      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) =     400.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.82
  AVERAGE FLOW DEPTH(FEET) =  3.89   TRAVEL TIME(MIN.) =  1.97
  Tc(MIN.) =  28.40
  SUBAREA AREA(ACRES) =    26.50      SUBAREA RUNOFF(CFS) =    28.62
  EFFECTIVE AREA(ACRES) =    366.48     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =     366.5          PEAK FLOW RATE(CFS) =     395.93

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.87   FLOW VELOCITY(FEET/SEC.) =  8.80
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31415.00 =   9450.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31415.00 TO NODE  31416.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    368.00  DOWNSTREAM(FEET) =    334.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1318.00   CHANNEL SLOPE = 0.0258
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.432
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap     SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        52.53      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) =     422.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.07
  AVERAGE FLOW DEPTH(FEET) =  3.94   TRAVEL TIME(MIN.) =  2.42
  Tc(MIN.) =  30.83
  SUBAREA AREA(ACRES) =    52.53      SUBAREA RUNOFF(CFS) =    53.50
  EFFECTIVE AREA(ACRES) =    419.00     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =     419.0          PEAK FLOW RATE(CFS) =     426.77

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.96   FLOW VELOCITY(FEET/SEC.) =  9.09
```

```
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31416.00 =  10768.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31416.00 TO NODE  31417.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    334.00  DOWNSTREAM(FEET) =    325.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1012.00   CHANNEL SLOPE = 0.0089
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.363
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap     SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        16.45      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) =     434.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.12
  AVERAGE FLOW DEPTH(FEET) =  4.86   TRAVEL TIME(MIN.) =  2.76
  Tc(MIN.) =  33.58
  SUBAREA AREA(ACRES) =    16.45      SUBAREA RUNOFF(CFS) =    15.74
  EFFECTIVE AREA(ACRES) =    435.46     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =     435.5          PEAK FLOW RATE(CFS) =     426.77
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  4.83   FLOW VELOCITY(FEET/SEC.) =  6.09
  LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31417.00 =  11780.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31417.00 TO NODE  31418.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =    301.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1232.00   CHANNEL SLOPE = 0.0195
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.309
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap     SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        13.50      0.30      0.694     -
  USER-DEFINED              -        32.00      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.909
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     447.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.28
  AVERAGE FLOW DEPTH(FEET) =  4.25   TRAVEL TIME(MIN.) =  2.48
  Tc(MIN.) =  36.06
  SUBAREA AREA(ACRES) =    45.50      SUBAREA RUNOFF(CFS) =    42.42
  EFFECTIVE AREA(ACRES) =    480.96     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.99
```

```
   TOTAL AREA(ACRES) =        481.0          PEAK FLOW RATE(CFS) =        437.72


   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  4.21    FLOW VELOCITY(FEET/SEC.) =   8.22
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31418.00 =   13012.00 FEET.
================================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =        481.0  TC(MIN.) =      36.06
   EFFECTIVE AREA(ACRES) =      480.96  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.991
   PEAK FLOW RATE(CFS)   =        437.72
================================================================================
================================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
_____
****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
              (c) Copyright 1983-2013 Advanced Engineering Software (aes)
                 Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                         Analysis prepared by:

                     Michael Baker International
                    5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 15 EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 25-YR EV MARCH 2019 CCHIU                                              *
 ************************************************************************

  FILE NAME: X31525EV.DAT
  TIME/DATE OF STUDY: 10:31 03/25/2019
 =========================================================================
  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   60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31500.00 TO NODE  31501.00 IS CODE =  21
 -------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   326.00
  ELEVATION DATA: UPSTREAM(FEET) =    416.00  DOWNSTREAM(FEET) =    379.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.043
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.578
  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
  "GRASS"                   -        0.66     0.30     1.000     0   11.04
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.35
  TOTAL AREA(ACRES) =       0.66   PEAK FLOW RATE(CFS) =       1.35

 ****************************************************************************
  FLOW PROCESS FROM NODE  31501.00 TO NODE  31502.00 IS CODE =  51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =    375.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  179.00   CHANNEL SLOPE = 0.0223
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.416
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap    SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        0.74     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) =     2.06
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.25
  AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   1.32
  Tc(MIN.) =   12.37
  SUBAREA AREA(ACRES) =     0.74       SUBAREA RUNOFF(CFS) =    1.41
  EFFECTIVE AREA(ACRES) =      1.40      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =      2.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.61    FLOW VELOCITY(FEET/SEC.) =  2.43
  LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31502.00 =    505.00 FEET.

 ****************************************************************************
  FLOW PROCESS FROM NODE  31502.00 TO NODE  31503.00 IS CODE =  51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    375.00  DOWNSTREAM(FEET) =    374.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  151.00   CHANNEL SLOPE = 0.0066
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.262
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -         1.23     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) =      3.75
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  1.67
 AVERAGE FLOW DEPTH(FEET) =  0.86   TRAVEL TIME(MIN.) =  1.51
 Tc(MIN.) =  13.87
 SUBAREA AREA(ACRES) =     1.23       SUBAREA RUNOFF(CFS) =    2.16
 EFFECTIVE AREA(ACRES) =     2.63     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) =      4.64

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.94   FLOW VELOCITY(FEET/SEC.) =  1.77
 LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31503.00 =    656.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE  31503.00 TO NODE  31504.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   374.00  DOWNSTREAM(FEET) =   372.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  184.00   CHANNEL SLOPE = 0.0109
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.146
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -         2.17     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) =      6.44
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.30
 AVERAGE FLOW DEPTH(FEET) =  0.97   TRAVEL TIME(MIN.) =  1.33
 Tc(MIN.) =  15.21
 SUBAREA AREA(ACRES) =     2.17       SUBAREA RUNOFF(CFS) =    3.60
 EFFECTIVE AREA(ACRES) =     4.80     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      7.97

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.05   FLOW VELOCITY(FEET/SEC.) =  2.42
 LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31504.00 =    840.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE  31504.00 TO NODE  31505.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   372.00  DOWNSTREAM(FEET) =   360.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  268.00   CHANNEL SLOPE = 0.0448
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 10 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             -         2.94     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) =     10.31
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.42
 AVERAGE FLOW DEPTH(FEET) =  0.88   TRAVEL TIME(MIN.) =  1.01
 Tc(MIN.) =  16.22
 SUBAREA AREA(ACRES) =     2.94       SUBAREA RUNOFF(CFS) =    4.68
 EFFECTIVE AREA(ACRES) =     7.74     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =     12.32

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.94   FLOW VELOCITY(FEET/SEC.) =  4.62
 LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31505.00 =   1108.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE  31505.00 TO NODE  31506.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   360.00  DOWNSTREAM(FEET) =   320.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  622.00   CHANNEL SLOPE = 0.0643
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.947
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -         6.03     0.30     0.984     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.984
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     16.80
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.73
 AVERAGE FLOW DEPTH(FEET) =  0.99   TRAVEL TIME(MIN.) =  1.81
 Tc(MIN.) =  18.03
 SUBAREA AREA(ACRES) =     6.03       SUBAREA RUNOFF(CFS) =    8.96
 EFFECTIVE AREA(ACRES) =    13.77     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.99
 TOTAL AREA(ACRES) =       13.8       PEAK FLOW RATE(CFS) =     20.43

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.07   FLOW VELOCITY(FEET/SEC.) =  6.00
 LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31506.00 =   1730.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE  31506.00 TO NODE  31507.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   320.00  DOWNSTREAM(FEET) =   315.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  391.00   CHANNEL SLOPE = 0.0128
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.855
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        2.67     0.30      0.611     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.611
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     22.44
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.13
   AVERAGE FLOW DEPTH(FEET) = 1.35   TRAVEL TIME(MIN.) =  1.58
   Tc(MIN.) =  19.61
   SUBAREA AREA(ACRES) =     2.67      SUBAREA RUNOFF(CFS) =    4.01
   EFFECTIVE AREA(ACRES) =     16.43      AREA-AVERAGED Fm(INCH/HR) =   0.28
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.93
   TOTAL AREA(ACRES) =       16.4          PEAK FLOW RATE(CFS) =      23.31

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.36   FLOW VELOCITY(FEET/SEC.) =  4.18
   LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31507.00 =    2121.00 FEET.


**************************************************************************
  FLOW PROCESS FROM NODE  31507.00 TO NODE  31508.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    315.00  DOWNSTREAM(FEET) =    313.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  427.00   CHANNEL SLOPE =  0.0047
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.741
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -       10.20     0.30      0.527     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     30.57
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.07
   AVERAGE FLOW DEPTH(FEET) = 1.82   TRAVEL TIME(MIN.) =  2.31
   Tc(MIN.) =  21.92
   SUBAREA AREA(ACRES) =    10.20      SUBAREA RUNOFF(CFS) =   14.52
   EFFECTIVE AREA(ACRES) =     26.63      AREA-AVERAGED Fm(INCH/HR) =   0.23
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.78
   TOTAL AREA(ACRES) =       26.6          PEAK FLOW RATE(CFS) =      36.13

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.94   FLOW VELOCITY(FEET/SEC.) =  3.20
   LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31508.00 =    2548.00 FEET.


**************************************************************************
  FLOW PROCESS FROM NODE  31508.00 TO NODE  31509.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    313.00  DOWNSTREAM(FEET) =    296.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  495.00   CHANNEL SLOPE =  0.0343
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.691
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        8.30     0.30      1.000     -
   USER-DEFINED             -       10.50     0.30      0.500     -
   USER-DEFINED             -        1.60     0.30      0.850     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.731
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     49.65
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.30
   AVERAGE FLOW DEPTH(FEET) = 1.51   TRAVEL TIME(MIN.) =  1.13
   Tc(MIN.) =  23.05
   SUBAREA AREA(ACRES) =    20.40      SUBAREA RUNOFF(CFS) =   27.02
   EFFECTIVE AREA(ACRES) =     47.03      AREA-AVERAGED Fm(INCH/HR) =   0.23
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.76
   TOTAL AREA(ACRES) =       47.0          PEAK FLOW RATE(CFS) =      61.97

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.64   FLOW VELOCITY(FEET/SEC.) =  7.72
   LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31509.00 =    3043.00 FEET.
==========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =       47.0   TC(MIN.) =      23.05
   EFFECTIVE AREA(ACRES) =      47.03  AREA-AVERAGED Fm(INCH/HR)= 0.23
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.757
   PEAK FLOW RATE(CFS)    =       61.97
==========================================================================

==========================================================================
   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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                         Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 16 EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 25-YR EV MARCH 2019 CCHIU                                              *
 *************************************************************************

  FILE NAME: X31625EV.DAT
  TIME/DATE OF STUDY: 10:33 03/25/2019
 ==========================================================================
   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   60.0   30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   50.0   25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3   40.0   20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4   30.0   15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5   20.0   10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31600.00 TO NODE  31601.00 IS CODE =  21
 --------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
   ELEVATION DATA: UPSTREAM(FEET) =   672.00  DOWNSTREAM(FEET) =   582.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.296
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.846
   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
   "GRASS"                  -        0.52     0.30     1.000    0   9.30
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =      1.20
   TOTAL AREA(ACRES) =       0.52   PEAK FLOW RATE(CFS) =      1.20

 *************************************************************************
   FLOW PROCESS FROM NODE  31601.00 TO NODE  31602.00 IS CODE =  51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   582.00  DOWNSTREAM(FEET) =   554.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  229.00   CHANNEL SLOPE = 0.1223
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 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
   USER-DEFINED              -        1.33     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) =     2.64
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.56
   AVERAGE FLOW DEPTH(FEET) =   0.44   TRAVEL TIME(MIN.) =   0.84
   Tc(MIN.) =   10.13
   SUBAREA AREA(ACRES) =      1.33      SUBAREA RUNOFF(CFS) =     2.89
   EFFECTIVE AREA(ACRES) =      1.86      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       4.02

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.51   FLOW VELOCITY(FEET/SEC.) =   5.07
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31602.00 =    558.00 FEET.

 *************************************************************************
   FLOW PROCESS FROM NODE  31602.00 TO NODE  31603.00 IS CODE =  51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   554.00  DOWNSTREAM(FEET) =   545.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  149.00   CHANNEL SLOPE = 0.0604
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.627
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
     LAND USE           GROUP     (ACRES) (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -         2.68    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.) =  4.46
 AVERAGE FLOW DEPTH(FEET) =   0.71   TRAVEL TIME(MIN.) =   0.56
 Tc(MIN.) =   10.69
 SUBAREA AREA(ACRES) =     2.68      SUBAREA RUNOFF(CFS) =     5.62
 EFFECTIVE AREA(ACRES) =      4.54     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        4.5       PEAK FLOW RATE(CFS) =        9.51

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.81   FLOW VELOCITY(FEET/SEC.) =  4.81
 LONGEST FLOWPATH FROM NODE 31600.00 TO NODE 31603.00 =    707.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE 31603.00 TO NODE 31604.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    525.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   184.00   CHANNEL SLOPE = 0.1087
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.562
  SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
     LAND USE           GROUP     (ACRES) (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -         3.07    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) =     12.63
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.48
 AVERAGE FLOW DEPTH(FEET) =   0.81   TRAVEL TIME(MIN.) =   0.47
 Tc(MIN.) =   11.16
 SUBAREA AREA(ACRES) =     3.07      SUBAREA RUNOFF(CFS) =     6.25
 EFFECTIVE AREA(ACRES) =      7.61     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        7.6       PEAK FLOW RATE(CFS) =       15.50

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.87   FLOW VELOCITY(FEET/SEC.) =  6.78
 LONGEST FLOWPATH FROM NODE 31600.00 TO NODE 31604.00 =    891.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE 31604.00 TO NODE 31605.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =    495.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   266.00   CHANNEL SLOPE = 0.1128
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.486
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
     LAND USE           GROUP     (ACRES) (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -         4.69    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) =     20.11
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.33
 AVERAGE FLOW DEPTH(FEET) =   0.96   TRAVEL TIME(MIN.) =   0.61
 Tc(MIN.) =   11.77
 SUBAREA AREA(ACRES) =     4.69      SUBAREA RUNOFF(CFS) =     9.23
 EFFECTIVE AREA(ACRES) =     12.30     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       12.3       PEAK FLOW RATE(CFS) =       24.20

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.03   FLOW VELOCITY(FEET/SEC.) =  7.68
 LONGEST FLOWPATH FROM NODE 31600.00 TO NODE 31605.00 =   1157.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE 31605.00 TO NODE 31606.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    495.00  DOWNSTREAM(FEET) =    470.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   444.00   CHANNEL SLOPE = 0.0563
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.356
  SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap      SCS
     LAND USE           GROUP     (ACRES) (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -         8.98    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) =     32.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.39
 AVERAGE FLOW DEPTH(FEET) =   1.30   TRAVEL TIME(MIN.) =   1.16
 Tc(MIN.) =   12.92
 SUBAREA AREA(ACRES) =     8.98      SUBAREA RUNOFF(CFS) =    16.61
 EFFECTIVE AREA(ACRES) =     21.28     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       21.3       PEAK FLOW RATE(CFS) =       39.37

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.40   FLOW VELOCITY(FEET/SEC.) =  6.71
 LONGEST FLOWPATH FROM NODE 31600.00 TO NODE 31606.00 =   1601.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE 31606.00 TO NODE 31607.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    439.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   763.00   CHANNEL SLOPE = 0.0406
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.173
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        20.37     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) =     56.55
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.49
   AVERAGE FLOW DEPTH(FEET) = 1.70    TRAVEL TIME(MIN.) = 1.96
   Tc(MIN.) =   14.88
   SUBAREA AREA(ACRES) =    20.37      SUBAREA RUNOFF(CFS) =   34.33
   EFFECTIVE AREA(ACRES) =     41.65      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       41.6         PEAK FLOW RATE(CFS) =       70.20

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.85   FLOW VELOCITY(FEET/SEC.) = 6.84
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31607.00 =   2364.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31607.00 TO NODE  31608.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    439.00  DOWNSTREAM(FEET) =    380.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1396.00   CHANNEL SLOPE = 0.0423
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.946
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        25.28     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) =     88.95
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.39
   AVERAGE FLOW DEPTH(FEET) = 2.00    TRAVEL TIME(MIN.) = 3.15
   Tc(MIN.) =   18.03
   SUBAREA AREA(ACRES) =    25.28      SUBAREA RUNOFF(CFS) =   37.46
   EFFECTIVE AREA(ACRES) =     66.93      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       66.9         PEAK FLOW RATE(CFS) =       99.18

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.09   FLOW VELOCITY(FEET/SEC.) = 7.59
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31608.00 =   3760.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31608.00 TO NODE  31609.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    380.00  DOWNSTREAM(FEET) =    350.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  715.00   CHANNEL SLOPE = 0.0420
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.858
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        19.63     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) =    112.94
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.82
   AVERAGE FLOW DEPTH(FEET) = 2.19    TRAVEL TIME(MIN.) = 1.52
   Tc(MIN.) =   19.56
   SUBAREA AREA(ACRES) =    19.63      SUBAREA RUNOFF(CFS) =   27.53
   EFFECTIVE AREA(ACRES) =     86.56      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       86.6         PEAK FLOW RATE(CFS) =      121.38

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.26   FLOW VELOCITY(FEET/SEC.) = 7.95
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31609.00 =   4475.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31609.00 TO NODE  31610.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    325.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  948.00   CHANNEL SLOPE = 0.0264
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.743
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        17.36     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) =    132.66
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.84
   AVERAGE FLOW DEPTH(FEET) = 2.54    TRAVEL TIME(MIN.) = 2.31
   Tc(MIN.) =   21.87
   SUBAREA AREA(ACRES) =    17.36      SUBAREA RUNOFF(CFS) =   22.55
   EFFECTIVE AREA(ACRES) =    103.92      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      103.9         PEAK FLOW RATE(CFS) =      134.95

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.56   FLOW VELOCITY(FEET/SEC.) = 6.87
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31610.00 =   5423.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31610.00 TO NODE  31611.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     325.00  DOWNSTREAM(FEET) =     310.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1182.00   CHANNEL SLOPE = 0.0127
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.625
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        69.76     0.30      0.990     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.990
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     176.65
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.92
   AVERAGE FLOW DEPTH(FEET) =  2.92   TRAVEL TIME(MIN.) =   2.85
   Tc(MIN.) =   24.72
   SUBAREA AREA(ACRES) =    69.76       SUBAREA RUNOFF(CFS) =   83.37
   EFFECTIVE AREA(ACRES) =    173.68      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       173.7         PEAK FLOW RATE(CFS) =     207.28

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.09   FLOW VELOCITY(FEET/SEC.) =  7.21
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31611.00 =   6605.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31611.00 TO NODE  31612.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     310.00  DOWNSTREAM(FEET) =     308.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  164.00   CHANNEL SLOPE = 0.0122
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.611
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        17.90     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) =     217.84
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.19
   AVERAGE FLOW DEPTH(FEET) =  3.18   TRAVEL TIME(MIN.) =   0.38
   Tc(MIN.) =   25.10
   SUBAREA AREA(ACRES) =    17.90       SUBAREA RUNOFF(CFS) =   21.12
   EFFECTIVE AREA(ACRES) =    191.58      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       191.6         PEAK FLOW RATE(CFS) =     226.18

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.22   FLOW VELOCITY(FEET/SEC.) =  7.26
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31612.00 =   6769.00 FEET.
===========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =       191.6  TC(MIN.) =      25.10
```

```
   EFFECTIVE AREA(ACRES) =     191.58  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.996
   PEAK FLOW RATE(CFS)   =      226.18
===========================================================================
===========================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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

                     Michael Baker International
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                        Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 17A EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 25-YR EV MARCH 2019 CCHIU                                            *
 *************************************************************************

  FILE NAME: X17A25EV.DAT
  TIME/DATE OF STUDY: 10:11 03/25/2019
===========================================================================
  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  60.0    30.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31700.00 TO NODE  31701.00 IS CODE =  21
---------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
  ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    515.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.410
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.530
  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
  "GRASS"                   -        0.43     0.30     1.000     0  11.41
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.86
  TOTAL AREA(ACRES) =        0.43   PEAK FLOW RATE(CFS) =       0.86

*************************************************************************
  FLOW PROCESS FROM NODE  31701.00 TO NODE  31702.00 IS CODE =  51
---------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    515.00  DOWNSTREAM(FEET) =    490.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   218.00   CHANNEL SLOPE = 0.1147
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.435
  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
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    1.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.58
  AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =   0.79
  Tc(MIN.) =   12.20
  SUBAREA AREA(ACRES) =      0.40       SUBAREA RUNOFF(CFS) =     0.77
  EFFECTIVE AREA(ACRES) =        0.83     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =          0.8        PEAK FLOW RATE(CFS) =       1.59

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   4.84
  LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31702.00 =     539.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31702.00 TO NODE  31703.00 IS CODE =  51
---------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE = 0.0833
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.305
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
 USER-DEFINED              -       1.55    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) =       2.99
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.10
 AVERAGE FLOW DEPTH(FEET) =  0.49   TRAVEL TIME(MIN.) =  1.22
 Tc(MIN.) =  13.42
 SUBAREA AREA(ACRES) =     1.55       SUBAREA RUNOFF(CFS) =    2.80
 EFFECTIVE AREA(ACRES) =     2.38    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       4.30

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.57   FLOW VELOCITY(FEET/SEC.) =  4.45
 LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31703.00 =    839.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31703.00 TO NODE  31704.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =    462.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    83.00   CHANNEL SLOPE = 0.0361
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.269
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       2.59    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) =       6.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.65
  AVERAGE FLOW DEPTH(FEET) =  0.78   TRAVEL TIME(MIN.) =   0.38
  Tc(MIN.) =  13.80
  SUBAREA AREA(ACRES) =     2.59       SUBAREA RUNOFF(CFS) =    4.59
  EFFECTIVE AREA(ACRES) =     4.97    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        5.0       PEAK FLOW RATE(CFS) =       8.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.87   FLOW VELOCITY(FEET/SEC.) =  3.91
  LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31704.00 =    922.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31704.00 TO NODE  31705.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    462.00  DOWNSTREAM(FEET) =    460.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    60.00   CHANNEL SLOPE = 0.0333
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.247
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       5.22    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) =      13.38
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.23
  AVERAGE FLOW DEPTH(FEET) =  1.03   TRAVEL TIME(MIN.) =  0.24
  Tc(MIN.) =  14.04
  SUBAREA AREA(ACRES) =     5.22       SUBAREA RUNOFF(CFS) =    9.15
  EFFECTIVE AREA(ACRES) =    10.19    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       10.2       PEAK FLOW RATE(CFS) =      17.86

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.15   FLOW VELOCITY(FEET/SEC.) =  4.52
  LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31705.00 =    982.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31705.00 TO NODE  31706.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    375.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   604.00   CHANNEL SLOPE = 0.1407
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.144
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       8.10    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) =      24.58
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.41
  AVERAGE FLOW DEPTH(FEET) =  0.99   TRAVEL TIME(MIN.) =  1.20
  Tc(MIN.) =  15.23
  SUBAREA AREA(ACRES) =     8.10       SUBAREA RUNOFF(CFS) =   13.44
  EFFECTIVE AREA(ACRES) =    18.29    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       18.3       PEAK FLOW RATE(CFS) =      30.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.07   FLOW VELOCITY(FEET/SEC.) =  8.82
  LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31706.00 =   1586.00 FEET.
===========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       18.3  TC(MIN.) =     15.23
  EFFECTIVE AREA(ACRES)  =      18.29  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      30.36
===========================================================================
===========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                      Michael Baker International
                    5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 17B EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 25-YR EV MARCH 2019 CCHIU                                            *
 **************************************************************************

   FILE NAME: X17B25EV.DAT
   TIME/DATE OF STUDY: 10:15 03/25/2019
 ========================================================================
   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  60.0     30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0     25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0     20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0     15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0     10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31710.00 TO NODE  31711.00 IS CODE =  21
 -----------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =======================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =    320.00
   ELEVATION DATA: UPSTREAM(FEET) =     631.00  DOWNSTREAM(FEET) =     605.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.719
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.492
   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
   "CHAPARRAL,BROADLEAF"     -        0.32      0.30    1.000     0   11.72
   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) =       0.32    PEAK FLOW RATE(CFS) =      0.64

 *************************************************************************
   FLOW PROCESS FROM NODE  31711.00 TO NODE  31712.00 IS CODE =  51
 -----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    588.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    71.00   CHANNEL SLOPE = 0.2394
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.462
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
       LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        0.56      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) =     1.18
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.77
   AVERAGE FLOW DEPTH(FEET) =   0.29    TRAVEL TIME(MIN.) =    0.25
   Tc(MIN.) =   11.97
   SUBAREA AREA(ACRES) =      0.56       SUBAREA RUNOFF(CFS) =     1.09
   EFFECTIVE AREA(ACRES) =       0.88     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) =       1.72

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   5.22
   LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31712.00 =     391.00 FEET.

 *************************************************************************
   FLOW PROCESS FROM NODE  31712.00 TO NODE  31713.00 IS CODE =  51
 -----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     588.00  DOWNSTREAM(FEET) =    565.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   181.00   CHANNEL SLOPE = 0.1271
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.383
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp          Ap      SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED                -        0.31       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) =       2.01
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.32
 AVERAGE FLOW DEPTH(FEET) =  0.39   TRAVEL TIME(MIN.) =   0.70
 Tc(MIN.) =   12.67
 SUBAREA AREA(ACRES) =      0.31       SUBAREA RUNOFF(CFS) =    0.59
 EFFECTIVE AREA(ACRES) =       1.20     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =         1.2       PEAK FLOW RATE(CFS) =        2.24

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   FLOW VELOCITY(FEET/SEC.) =  4.47
 LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31713.00 =     572.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  31713.00 TO NODE  31714.00 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =     545.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  185.00   CHANNEL SLOPE =  0.1081
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.315
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp          Ap      SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED                -        1.36       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) =       3.48
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.66
 AVERAGE FLOW DEPTH(FEET) =  0.50   TRAVEL TIME(MIN.) =   0.66
 Tc(MIN.) =   13.33
 SUBAREA AREA(ACRES) =      1.36       SUBAREA RUNOFF(CFS) =    2.46
 EFFECTIVE AREA(ACRES) =       2.56     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) =        4.63

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.55   FLOW VELOCITY(FEET/SEC.) =  5.03
 LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31714.00 =     757.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  31714.00 TO NODE  31715.00 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =     531.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  128.00   CHANNEL SLOPE =  0.1094
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.278
 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
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.12
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.60
 AVERAGE FLOW DEPTH(FEET) =  0.65   TRAVEL TIME(MIN.) =   0.38
 Tc(MIN.) =   13.71
 SUBAREA AREA(ACRES) =      2.80       SUBAREA RUNOFF(CFS) =    4.98
 EFFECTIVE AREA(ACRES) =       5.35     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =         5.4       PEAK FLOW RATE(CFS) =        9.53

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.73   FLOW VELOCITY(FEET/SEC.) =  6.00
 LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31715.00 =     885.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  31715.00 TO NODE  31716.00 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM(FEET) =     507.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  270.00   CHANNEL SLOPE =  0.0889
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.211
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/        SCS SOIL    AREA        Fp          Ap      SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED                -        5.95       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) =      14.64
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.19
 AVERAGE FLOW DEPTH(FEET) =  0.89   TRAVEL TIME(MIN.) =   0.73
 Tc(MIN.) =   14.44
 SUBAREA AREA(ACRES) =      5.95       SUBAREA RUNOFF(CFS) =   10.23
 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) =       19.43

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.99   FLOW VELOCITY(FEET/SEC.) =  6.65
 LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31716.00 =    1155.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  31716.00 TO NODE  31717.00 IS CODE =  51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    507.00  DOWNSTREAM(FEET) =     400.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1020.00   CHANNEL SLOPE =  0.1049
```

```
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.043
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap     SCS
    LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED              -       13.90     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) =     30.35
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.97
AVERAGE FLOW DEPTH(FEET) =   1.13   TRAVEL TIME(MIN.) =   2.13
Tc(MIN.) =   16.57
SUBAREA AREA(ACRES) =    13.90      SUBAREA RUNOFF(CFS) =   21.81
EFFECTIVE AREA(ACRES) =     25.20     AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       25.2        PEAK FLOW RATE(CFS) =      39.54

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.25   FLOW VELOCITY(FEET/SEC.) =   8.48
LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31717.00 =    2175.00 FEET.
==============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =        25.2  TC(MIN.) =      16.57
EFFECTIVE AREA(ACRES) =      25.20  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)   =       39.54
==============================================================================
==============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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

                     Michael Baker International
                    5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 18 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 25-YR EV MARCH 2019 CCHIU                                          *
 *********************************************************************

   FILE NAME: X31825EV.DAT
   TIME/DATE OF STUDY: 10:33 03/25/2019
 ===========================================================================
   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  60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31800.00 TO NODE  31801.00 IS CODE =  21
 ---------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ===========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
   ELEVATION DATA: UPSTREAM(FEET) =    729.00  DOWNSTREAM(FEET) =     630.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.120
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.877
   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
   "CHAPARRAL,BROADLEAF"      -       0.10     0.30     1.000      0   9.12
   NATURAL FAIR COVER
   "CHAPARRAL,NARROWLEAF"     -       0.10     0.30     1.000      0   9.12
   NATURAL FAIR COVER
   "OPEN BRUSH"              -       1.30     0.30     1.000      0   9.12
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       3.48
   TOTAL AREA(ACRES) =       1.50   PEAK FLOW RATE(CFS) =      3.48


 ***************************************************************************
   FLOW PROCESS FROM NODE  31801.00 TO NODE  31802.00 IS CODE =  51
 ---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    597.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  196.00   CHANNEL SLOPE = 0.1684
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       3.48
   FLOW VELOCITY(FEET/SEC.) =   5.47   FLOW DEPTH(FEET) =   0.46
   TRAVEL TIME(MIN.) =   0.60   Tc(MIN.) =    9.72
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31802.00 =     525.00 FEET.

 ***************************************************************************
   FLOW PROCESS FROM NODE  31802.00 TO NODE  31802.00 IS CODE =  81
 ---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ===========================================================================
   MAINLINE Tc(MIN.) =   9.72
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.774
   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              -       1.80     0.30     1.000      -
   USER-DEFINED              -       0.10     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) =      2.00      SUBAREA RUNOFF(CFS) =    4.45
   EFFECTIVE AREA(ACRES) =      3.50   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       3.5       PEAK FLOW RATE(CFS) =       7.79

 ***************************************************************************
   FLOW PROCESS FROM NODE  31802.00 TO NODE  31803.00 IS CODE =  51
 ---------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    597.00  DOWNSTREAM(FEET) =    565.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   225.00   CHANNEL SLOPE = 0.1422
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      7.79
  FLOW VELOCITY(FEET/SEC.) =   6.38   FLOW DEPTH(FEET) =   0.64
  TRAVEL TIME(MIN.) =   0.59   Tc(MIN.) =   10.31
  LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31803.00 =    750.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31803.00 TO NODE  31803.00 IS CODE = 81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================
  MAINLINE Tc(MIN.) =   10.31
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.682
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        2.10      0.30      1.000     -
  USER-DEFINED              -        0.20      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) =   2.30      SUBAREA RUNOFF(CFS) =    4.93
  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) =      12.44

**************************************************************************
  FLOW PROCESS FROM NODE  31803.00 TO NODE  31804.00 IS CODE = 51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =    530.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   228.00   CHANNEL SLOPE = 0.1535
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     12.44
  FLOW VELOCITY(FEET/SEC.) =   7.32   FLOW DEPTH(FEET) =   0.75
  TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =   10.82
  LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31804.00 =    978.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31804.00 TO NODE  31804.00 IS CODE = 81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================
  MAINLINE Tc(MIN.) =   10.82
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.608
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        4.10      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) =   4.70      SUBAREA RUNOFF(CFS) =    9.76
  EFFECTIVE AREA(ACRES) =     10.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =       10.5      PEAK FLOW RATE(CFS) =      21.81

**************************************************************************
  FLOW PROCESS FROM NODE  31804.00 TO NODE  31805.00 IS CODE = 51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    530.00  DOWNSTREAM(FEET) =    498.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   414.00   CHANNEL SLOPE = 0.0773
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     21.81
  FLOW VELOCITY(FEET/SEC.) =   6.52   FLOW DEPTH(FEET) =   1.06
  TRAVEL TIME(MIN.) =   1.06   Tc(MIN.) =   11.88
  LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31805.00 =   1392.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31805.00 TO NODE  31805.00 IS CODE = 81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================
  MAINLINE Tc(MIN.) =   11.88
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.472
  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              -        5.70      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) =   6.70      SUBAREA RUNOFF(CFS) =   13.10
  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) =      33.63

**************************************************************************
  FLOW PROCESS FROM NODE  31805.00 TO NODE  31806.00 IS CODE = 51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    498.00  DOWNSTREAM(FEET) =    454.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE = 0.0649
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     33.63
  FLOW VELOCITY(FEET/SEC.) =   6.79   FLOW DEPTH(FEET) =   1.28
  TRAVEL TIME(MIN.) =   1.66   Tc(MIN.) =   13.55
  LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31806.00 =   2070.00 FEET.

**************************************************************************
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```
   FLOW PROCESS FROM NODE  31806.00 TO NODE  31806.00 IS CODE =  81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   13.55
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.293
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap       SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        2.10     0.30     1.000      -
   USER-DEFINED             -        0.40     0.30     1.000      -
   USER-DEFINED             -        7.90     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) =   10.40      SUBAREA RUNOFF(CFS) =   18.66
   EFFECTIVE AREA(ACRES) =     27.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       27.6       PEAK FLOW RATE(CFS) =      49.51

*************************************************************************
   FLOW PROCESS FROM NODE  31806.00 TO NODE  31819.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    454.00  DOWNSTREAM(FEET) =    410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   737.00   CHANNEL SLOPE =  0.0597
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      49.51
   FLOW VELOCITY(FEET/SEC.) =  7.26   FLOW DEPTH(FEET) =   1.51
   TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =    15.24
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31819.00 =    2807.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE =  81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   15.24
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.144
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap       SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        0.70     0.30     1.000      -
   USER-DEFINED             -        0.30     0.30     1.000      -
   USER-DEFINED             -        5.60     0.30     1.000      -
   USER-DEFINED             -        0.50     0.30     1.000      -
   USER-DEFINED             -        0.30     0.30     1.000      -
   USER-DEFINED             -        6.30     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) =   13.70      SUBAREA RUNOFF(CFS) =   22.73
   EFFECTIVE AREA(ACRES) =     41.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       41.3       PEAK FLOW RATE(CFS) =      68.53

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   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE =  81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   15.24
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.144
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap       SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        0.20     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) =    0.20      SUBAREA RUNOFF(CFS) =    0.33
   EFFECTIVE AREA(ACRES) =     41.50   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       41.5       PEAK FLOW RATE(CFS) =      68.87

*************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 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.) =   15.24
   RAINFALL INTENSITY(INCH/HR) =   2.14
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =      41.50
   TOTAL STREAM AREA(ACRES) =      41.50
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      68.87

*************************************************************************
   FLOW PROCESS FROM NODE  31810.00 TO NODE  31811.00 IS CODE =  21
-------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   395.00
   ELEVATION DATA: UPSTREAM(FEET) =    697.00  DOWNSTREAM(FEET) =    645.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.576
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.509
   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  11.58
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =     0.80
   TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      0.80

*************************************************************************
   FLOW PROCESS FROM NODE  31811.00 TO NODE  31812.00 IS CODE =  51
-------------------------------------------------------------------------
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```
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     645.00  DOWNSTREAM(FEET) =     610.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   148.00   CHANNEL SLOPE = 0.2365
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       0.80
   FLOW VELOCITY(FEET/SEC.) =   4.35   FLOW DEPTH(FEET) =   0.25
   TRAVEL TIME(MIN.) =   0.57   Tc(MIN.) =    12.14
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31812.00 =     543.00 FEET.
***************************************************************************
   FLOW PROCESS FROM NODE  31812.00 TO NODE  31812.00 IS CODE =  81
---------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   MAINLINE Tc(MIN.) =   12.14
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.441
   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     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.58
   EFFECTIVE AREA(ACRES) =     0.70   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.000
   TOTAL AREA(ACRES) =         0.7       PEAK FLOW RATE(CFS) =      1.35
***************************************************************************
   FLOW PROCESS FROM NODE  31812.00 TO NODE  31813.00 IS CODE =  51
---------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   610.00  DOWNSTREAM(FEET) =     591.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   176.00   CHANNEL SLOPE = 0.1080
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       1.35
   FLOW VELOCITY(FEET/SEC.) =   3.71   FLOW DEPTH(FEET) =   0.35
   TRAVEL TIME(MIN.) =   0.79   Tc(MIN.) =    12.93
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31813.00 =     719.00 FEET.
***************************************************************************
   FLOW PROCESS FROM NODE  31813.00 TO NODE  31813.00 IS CODE =  81
---------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   MAINLINE Tc(MIN.) =   12.93
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.355
   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     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
   SUBAREA AREA(ACRES) =     1.10      SUBAREA RUNOFF(CFS) =    2.03
   EFFECTIVE AREA(ACRES) =      1.80   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.000
   TOTAL AREA(ACRES) =         1.8       PEAK FLOW RATE(CFS) =      3.33
***************************************************************************
   FLOW PROCESS FROM NODE  31813.00 TO NODE  31814.00 IS CODE =  51
---------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     591.00  DOWNSTREAM(FEET) =     576.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   184.00   CHANNEL SLOPE = 0.0815
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       3.33
   FLOW VELOCITY(FEET/SEC.) =   4.17   FLOW DEPTH(FEET) =   0.52
   TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    13.67
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31814.00 =     903.00 FEET.
***************************************************************************
   FLOW PROCESS FROM NODE  31814.00 TO NODE  31814.00 IS CODE =  81
---------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   MAINLINE Tc(MIN.) =   13.67
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.281
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   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) =     3.50      SUBAREA RUNOFF(CFS) =    6.24
   EFFECTIVE AREA(ACRES) =      5.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.000
   TOTAL AREA(ACRES) =         5.3       PEAK FLOW RATE(CFS) =      9.45
***************************************************************************
   FLOW PROCESS FROM NODE  31814.00 TO NODE  31815.00 IS CODE =  51
---------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     576.00  DOWNSTREAM(FEET) =     566.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   120.00   CHANNEL SLOPE = 0.0833
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       9.45
   FLOW VELOCITY(FEET/SEC.) =   5.45   FLOW DEPTH(FEET) =   0.76
   TRAVEL TIME(MIN.) =   0.37   Tc(MIN.) =    14.04
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31815.00 =    1023.00 FEET.
***************************************************************************
   FLOW PROCESS FROM NODE  31815.00 TO NODE  31815.00 IS CODE =  81
---------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
```

```
   MAINLINE Tc(MIN.) =   14.04
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.247
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED              -         3.10      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) =   3.10    SUBAREA RUNOFF(CFS) =    5.43
   EFFECTIVE AREA(ACRES) =     8.40   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        8.4      PEAK FLOW RATE(CFS) =     14.72

***************************************************************************
   FLOW PROCESS FROM NODE  31815.00 TO NODE  31816.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   566.00  DOWNSTREAM(FEET) =    544.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.1009
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      14.72
   FLOW VELOCITY(FEET/SEC.) =  6.53   FLOW DEPTH(FEET) =   0.87
   TRAVEL TIME(MIN.) =   0.56   Tc(MIN.) =   14.59
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31816.00 =   1241.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31816.00 TO NODE  31816.00 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
    USER-DEFINED              -         1.10      0.30      1.000      -
    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) =   5.80    SUBAREA RUNOFF(CFS) =    9.91
   EFFECTIVE AREA(ACRES) =    14.20   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =       14.2      PEAK FLOW RATE(CFS) =     24.25

***************************************************************************
   FLOW PROCESS FROM NODE  31816.00 TO NODE  31817.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   544.00  DOWNSTREAM(FEET) =    488.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  668.00   CHANNEL SLOPE = 0.0838
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      24.25
```

```
   FLOW VELOCITY(FEET/SEC.) =  6.92   FLOW DEPTH(FEET) =  1.08
   TRAVEL TIME(MIN.) =   1.61   Tc(MIN.) =   16.20
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31817.00 =    1909.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31817.00 TO NODE  31817.00 IS CODE = 81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   MAINLINE Tc(MIN.) =   16.20
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.070
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED              -         0.10      0.30      1.000      -
    USER-DEFINED              -        12.40      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) =  12.50    SUBAREA RUNOFF(CFS) =   19.91
   EFFECTIVE AREA(ACRES) =    26.70   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =       26.7      PEAK FLOW RATE(CFS) =     42.53

***************************************************************************
   FLOW PROCESS FROM NODE  31817.00 TO NODE  31818.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   488.00  DOWNSTREAM(FEET) =    442.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  580.00   CHANNEL SLOPE = 0.0793
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      42.53
   FLOW VELOCITY(FEET/SEC.) =  7.81   FLOW DEPTH(FEET) =  1.35
   TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =   17.44
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31818.00 =   2489.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31818.00 TO NODE  31818.00 IS CODE = 81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   MAINLINE Tc(MIN.) =   17.44
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.984
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED              -         2.60      0.30      1.000      -
    USER-DEFINED              -        14.90      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) =  17.50    SUBAREA RUNOFF(CFS) =   26.53
   EFFECTIVE AREA(ACRES) =    44.20   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =       44.2      PEAK FLOW RATE(CFS) =     67.00

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

```
    FLOW PROCESS FROM NODE  31818.00 TO NODE  31819.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    442.00  DOWNSTREAM(FEET) =    410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  646.00   CHANNEL SLOPE = 0.0495
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      67.00
   FLOW VELOCITY(FEET/SEC.) =  7.29   FLOW DEPTH(FEET) =  1.75
   TRAVEL TIME(MIN.) =  1.48   Tc(MIN.) =  18.92
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31819.00 =    3135.00 FEET.
********************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =  18.92
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.894
   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              -          0.80      0.30      1.000     -
   USER-DEFINED              -          7.10      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) =    8.20      SUBAREA RUNOFF(CFS) =    11.76
   EFFECTIVE AREA(ACRES) =     52.40   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      52.4      PEAK FLOW RATE(CFS) =      75.17

********************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 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.) =  18.92
   RAINFALL INTENSITY(INCH/HR) =  1.89
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =     52.40
   TOTAL STREAM AREA(ACRES) =     52.40
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      75.17

   ** CONFLUENCE DATA **
   STREAM      Q      Tc   Intensity  Fp(Fm)     Ap      Ae    HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1        68.87  15.24   2.144   0.30( 0.30) 1.00    41.5   31800.00
     2        75.17  18.92   1.894   0.30( 0.30) 1.00    52.4   31810.00

   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       138.91  15.24   2.144   0.30( 0.30) 1.00    83.7   31800.00
     2       134.71  18.92   1.894   0.30( 0.30) 1.00    93.9   31810.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      138.91    Tc(MIN.) =     15.24
   EFFECTIVE AREA(ACRES) =        83.71   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =         93.9
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31819.00 =    3135.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31820.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    363.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1134.00   CHANNEL SLOPE = 0.0414
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
   CHANNEL FLOW THRU SUBAREA(CFS) =     138.91
   FLOW VELOCITY(FEET/SEC.) =  8.19   FLOW DEPTH(FEET) =  2.38
   TRAVEL TIME(MIN.) =  2.31   Tc(MIN.) =  17.54
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31820.00 =    4269.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  31820.00 TO NODE  31820.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =  17.54
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.977
   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              -          2.30      0.30      1.000     -
   USER-DEFINED              -          1.70      0.30      1.000     -
   USER-DEFINED              -          3.30      0.30      1.000     -
   USER-DEFINED              -          2.50      0.30      1.000     -
   USER-DEFINED              -          8.50      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) =   18.70      SUBAREA RUNOFF(CFS) =    28.23
   EFFECTIVE AREA(ACRES) =    102.41   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       112.6      PEAK FLOW RATE(CFS) =     154.61

********************************************************************************
   FLOW PROCESS FROM NODE  31820.00 TO NODE  31820.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
```

```
   MAINLINE Tc(MIN.) =   17.54
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.977
   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              -        0.80      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) =    1.50      SUBAREA RUNOFF(CFS) =    2.26
   EFFECTIVE AREA(ACRES) =   103.91   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     114.1      PEAK FLOW RATE(CFS) =     156.87

*****************************************************************************
   FLOW PROCESS FROM NODE  31820.00 TO NODE  31821.00 IS CODE = 51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    363.00  DOWNSTREAM(FEET) =    325.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   614.00   CHANNEL SLOPE =  0.0619
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
   CHANNEL FLOW THRU SUBAREA(CFS) =     156.87
   FLOW VELOCITY(FEET/SEC.) =  9.81    FLOW DEPTH(FEET) =  2.31
   TRAVEL TIME(MIN.) =   1.04   Tc(MIN.) =   18.59
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31821.00 =    4883.00 FEET.


*****************************************************************************
   FLOW PROCESS FROM NODE  31821.00 TO NODE  31821.00 IS CODE = 81
-----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
   MAINLINE Tc(MIN.) =   18.59
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.913
   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              -        1.40      0.30      1.000      -
   USER-DEFINED              -        0.90      0.30      1.000      -
   USER-DEFINED              -        1.00      0.30      1.000      -
   USER-DEFINED              -        0.50      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) =    4.50      SUBAREA RUNOFF(CFS) =    6.53
   EFFECTIVE AREA(ACRES) =   108.41   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     118.6      PEAK FLOW RATE(CFS) =     157.39


*****************************************************************************
   FLOW PROCESS FROM NODE  31821.00 TO NODE  31821.00 IS CODE = 81
-----------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
```

```
   MAINLINE Tc(MIN.) =   18.59
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.913
   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      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.29
   EFFECTIVE AREA(ACRES) =   108.61   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     118.8      PEAK FLOW RATE(CFS) =     157.68
=============================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =     118.8   TC(MIN.) =     18.59
   EFFECTIVE AREA(ACRES) =   108.61   AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.000
   PEAK FLOW RATE(CFS)   =     157.68

   ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc   Intensity  Fp(Fm)    Ap      Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
     1      157.68  18.59   1.913   0.30( 0.30) 1.00   108.6  31800.00
     2      152.22  22.30   1.724   0.30( 0.30) 1.00   118.8  31810.00
=============================================================================
=============================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
 _____
 ****************************************************************
         RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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           Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                       Analysis prepared by:

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                       Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY ***************************
 * RMV PA-4 WATERSHED 2 EXISTING CONDITION                                 *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                   *
 * 25-YR EV MARCH 2019 CCHIU                                               *
 *************************************************************************

   FILE NAME: X40225EV.DAT
   TIME/DATE OF STUDY: 10:33 03/25/2019
 =================================================================
   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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40200.00 TO NODE  40201.00 IS CODE =  21
 -----------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   319.00
   ELEVATION DATA: UPSTREAM(FEET) =    647.00  DOWNSTREAM(FEET) =    555.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.085
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.883
   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
   "CHAPARRAL,BROADLEAF"      -        0.30      0.30     1.000      0   9.08
   NATURAL FAIR COVER
   "OPEN BRUSH"               -        0.20      0.30     1.000      0   9.08
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      1.16
   TOTAL AREA(ACRES) =       0.50   PEAK FLOW RATE(CFS) =       1.16

 *************************************************************************
   FLOW PROCESS FROM NODE  40201.00 TO NODE  40202.00 IS CODE =  51
 -----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    555.00  DOWNSTREAM(FEET) =    525.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  150.00   CHANNEL SLOPE = 0.2000
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       1.16
   FLOW VELOCITY(FEET/SEC.) =   4.46    FLOW DEPTH(FEET) =   0.29
   TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =    9.65
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40202.00 =    469.00 FEET.

 *************************************************************************
   FLOW PROCESS FROM NODE  40202.00 TO NODE  40202.00 IS CODE =  81
 -----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 =================================================================
   MAINLINE Tc(MIN.) =   9.65
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.786
   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               -        0.10      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) =   0.70      SUBAREA RUNOFF(CFS) =    1.57
   EFFECTIVE AREA(ACRES) =     1.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       1.2        PEAK FLOW RATE(CFS) =       2.68

 *************************************************************************
   FLOW PROCESS FROM NODE  40202.00 TO NODE  40203.00 IS CODE =  51
 -----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =     505.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE = 0.1143
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =        2.68
  FLOW VELOCITY(FEET/SEC.) =  4.47   FLOW DEPTH(FEET) =  0.45
  TRAVEL TIME(MIN.) =  0.65   Tc(MIN.) =  10.30
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40203.00 =    644.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  40203.00 TO NODE  40203.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.30
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.683
  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               -        0.10      0.30      1.000     -
  USER-DEFINED               -        0.40      0.30      1.000     -
  USER-DEFINED               -        0.10      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) =   0.70      SUBAREA RUNOFF(CFS) =    1.50
  EFFECTIVE AREA(ACRES) =      1.90   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =         1.9        PEAK FLOW RATE(CFS) =       4.08

********************************************************************************
  FLOW PROCESS FROM NODE  40203.00 TO NODE  40204.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    505.00  DOWNSTREAM(FEET) =    493.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.0550
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =        4.08
  FLOW VELOCITY(FEET/SEC.) =  3.78   FLOW DEPTH(FEET) =   0.60
  TRAVEL TIME(MIN.) =  0.96   Tc(MIN.) =  11.26
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40204.00 =    862.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  40204.00 TO NODE  40204.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.26
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.550
  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               -        0.10      0.30      1.000     -
```

```
  USER-DEFINED               -        0.30      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) =   1.40      SUBAREA RUNOFF(CFS) =    2.83
  EFFECTIVE AREA(ACRES) =      3.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =         3.3        PEAK FLOW RATE(CFS) =       6.68

********************************************************************************
  FLOW PROCESS FROM NODE  40204.00 TO NODE  40205.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    493.00  DOWNSTREAM(FEET) =    472.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.0963
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =        6.68
  FLOW VELOCITY(FEET/SEC.) =  5.25   FLOW DEPTH(FEET) =   0.65
  TRAVEL TIME(MIN.) =  0.69   Tc(MIN.) =  11.95
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40205.00 =   1080.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  40205.00 TO NODE  40205.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.95
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.464
  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               -        0.10      0.30      1.000     -
  USER-DEFINED               -        0.30      0.30      1.000     -
  USER-DEFINED               -        1.30      0.30      1.000     -
  USER-DEFINED               -        0.20      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) =    4.09
  EFFECTIVE AREA(ACRES) =      5.40   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =         5.4        PEAK FLOW RATE(CFS) =      10.52

********************************************************************************
  FLOW PROCESS FROM NODE  40205.00 TO NODE  40206.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    472.00  DOWNSTREAM(FEET) =    455.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   71.00   CHANNEL SLOPE = 0.2394
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       10.52
  FLOW VELOCITY(FEET/SEC.) =  8.26   FLOW DEPTH(FEET) =   0.65
```

```
   TRAVEL TIME(MIN.) =   0.14   Tc(MIN.) =   12.09
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40206.00 =    1151.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  40206.00 TO NODE  40206.00 IS CODE =  81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   12.09
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.447
   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              -        0.30     0.30     1.000     -
   USER-DEFINED              -        0.20     0.30     1.000     -
   USER-DEFINED              -        1.10     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) =   3.80     SUBAREA RUNOFF(CFS) =    7.34
   EFFECTIVE AREA(ACRES) =    9.20   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =      9.2     PEAK FLOW RATE(CFS) =     17.78


*************************************************************************
   FLOW PROCESS FROM NODE  40206.00 TO NODE  40207.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    400.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE = 0.1389
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =    17.78
   FLOW VELOCITY(FEET/SEC.) =   7.75   FLOW DEPTH(FEET) =   0.87
   TRAVEL TIME(MIN.) =   0.85   Tc(MIN.) =   12.95
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40207.00 =    1547.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  40207.00 TO NODE  40207.00 IS CODE =  81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   12.95
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.354
   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              -        0.20     0.30     1.000     -
   USER-DEFINED              -        1.10     0.30     1.000     -
   USER-DEFINED              -        0.90     0.30     1.000     -
   USER-DEFINED              -        2.90     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) =    6.30     SUBAREA RUNOFF(CFS) =   11.64
   EFFECTIVE AREA(ACRES) =   15.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =     15.5     PEAK FLOW RATE(CFS) =     28.65


*************************************************************************
   FLOW PROCESS FROM NODE  40207.00 TO NODE  40208.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    400.00  DOWNSTREAM(FEET) =    384.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   452.00   CHANNEL SLOPE = 0.0354
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =    28.65
   FLOW VELOCITY(FEET/SEC.) =   6.46   FLOW DEPTH(FEET) =   1.22
   TRAVEL TIME(MIN.) =   1.17   Tc(MIN.) =   14.11
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40208.00 =    1999.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   14.11
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.240
   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              -        0.90     0.30     1.000     -
   USER-DEFINED              -        1.70     0.30     1.000     -
   USER-DEFINED              -        0.10     0.30     1.000     -
   USER-DEFINED              -        0.20     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) =    3.00     SUBAREA RUNOFF(CFS) =    5.24
   EFFECTIVE AREA(ACRES) =   18.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =     18.5     PEAK FLOW RATE(CFS) =     32.30


*************************************************************************
   FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   14.11
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.240
   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              -        1.30     0.30     1.000     -
   USER-DEFINED              -        1.60     0.30     1.000     -
   USER-DEFINED              -        0.90     0.30     1.000     -
   USER-DEFINED              -        2.10     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) =    7.20    SUBAREA RUNOFF(CFS) =   12.57
  EFFECTIVE AREA(ACRES) =    25.70   AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =      25.7     PEAK FLOW RATE(CFS) =     44.87
****************************************************************************
  FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE = 81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   14.11
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.240
  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               -        0.20     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) =    2.80    SUBAREA RUNOFF(CFS) =    4.89
  EFFECTIVE AREA(ACRES) =    28.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =      28.5     PEAK FLOW RATE(CFS) =     49.76

****************************************************************************
  FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE = 81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   14.11
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.240
  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     0.100     -
   USER-DEFINED               -        0.10     0.30     0.500     -
   USER-DEFINED               -        1.60     0.30     1.000     -
   USER-DEFINED               -        1.20     0.30     1.000     -
   USER-DEFINED               -        0.20     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 = 0.852
  SUBAREA AREA(ACRES) =    4.60    SUBAREA RUNOFF(CFS) =    8.22
  EFFECTIVE AREA(ACRES) =    33.10   AREA-AVERAGED Fm(INCH/HR) = 0.29
  AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.98
  TOTAL AREA(ACRES) =      33.1     PEAK FLOW RATE(CFS) =     57.98

****************************************************************************
  FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE = 81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   14.11
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.240
  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) =    0.70
  EFFECTIVE AREA(ACRES) =    33.50   AREA-AVERAGED Fm(INCH/HR) = 0.29
  AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.98
  TOTAL AREA(ACRES) =      33.5     PEAK FLOW RATE(CFS) =     58.68
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =      33.5  TC(MIN.) =    14.11
  EFFECTIVE AREA(ACRES) =      33.50  AREA-AVERAGED Fm(INCH/HR)= 0.29
  AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.980
  PEAK FLOW RATE(CFS)    =      58.68
==========================================================================

==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
*************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
            (c) Copyright 1983-2013 Advanced Engineering Software (aes)
              Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

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                         Santa Ana, CA92707


  ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-4 WATERSHED 3 EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 25-YR EV MARCH 2019 CCHIU                                             *
  ***********************************************************************

   FILE NAME: X40325EV.DAT
   TIME/DATE OF STUDY: 10:39 03/25/2019
 ===========================================================================
   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   60.0     30.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   50.0     25.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  3   40.0     20.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  4   30.0     15.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  5   20.0     10.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40300.00 TO NODE  40301.00 IS CODE = 21
 -------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ===========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
   ELEVATION DATA: UPSTREAM(FEET) =    790.00  DOWNSTREAM(FEET) =    720.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.541
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.803
   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
   "CHAPARRAL,BROADLEAF"      -         0.39     0.30     1.000    0   9.54
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.89
   TOTAL AREA(ACRES) =        0.39    PEAK FLOW RATE(CFS) =        0.89

 *************************************************************************
   FLOW PROCESS FROM NODE  40301.00 TO NODE  40302.00 IS CODE = 51
 -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    675.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  191.00   CHANNEL SLOPE = 0.2356
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.707
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap    SCS
         LAND USE           GROUP     (ACRES) (INCH/HR) (DECIMAL) CN
   USER-DEFINED               -         0.88     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) =      1.85
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.31
   AVERAGE FLOW DEPTH(FEET) =   0.34   TRAVEL TIME(MIN.) =    0.60
   Tc(MIN.) =   10.14
   SUBAREA AREA(ACRES) =     0.88       SUBAREA RUNOFF(CFS) =    1.92
   EFFECTIVE AREA(ACRES) =      1.28      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) =       2.77

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =   5.95
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40302.00 =     507.00 FEET.

 *************************************************************************
   FLOW PROCESS FROM NODE  40302.00 TO NODE  40303.00 IS CODE = 51
 -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =    625.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  179.00   CHANNEL SLOPE = 0.2793
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.642
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp         Ap        SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR)   (DECIMAL)    CN
   USER-DEFINED               -        0.84       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) =       3.65
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.76
   AVERAGE FLOW DEPTH(FEET) =  0.42   TRAVEL TIME(MIN.) =   0.44
   Tc(MIN.) =   10.58
   SUBAREA AREA(ACRES) =     0.84      SUBAREA RUNOFF(CFS) =    1.76
   EFFECTIVE AREA(ACRES) =      2.12     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       2.1       PEAK FLOW RATE(CFS) =       4.46

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.45   FLOW VELOCITY(FEET/SEC.) =   7.18
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40303.00 =    686.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40303.00 TO NODE  40304.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    625.00  DOWNSTREAM(FEET) =    557.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   161.00   CHANNEL SLOPE = 0.4224
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.602
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap        SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)   (DECIMAL)    CN
   USER-DEFINED               -        2.94       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) =       7.50
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.47
   AVERAGE FLOW DEPTH(FEET) =  0.51   TRAVEL TIME(MIN.) =   0.28
   Tc(MIN.) =   10.87
   SUBAREA AREA(ACRES) =     2.94      SUBAREA RUNOFF(CFS) =    6.09
   EFFECTIVE AREA(ACRES) =      5.06     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       5.1       PEAK FLOW RATE(CFS) =      10.48

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.58   FLOW VELOCITY(FEET/SEC.) =  10.28
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40304.00 =    847.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40304.00 TO NODE  40305.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    557.00  DOWNSTREAM(FEET) =    548.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    42.00   CHANNEL SLOPE = 0.2143
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
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   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.591
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap        SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)   (DECIMAL)    CN
   USER-DEFINED               -        1.68       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) =      12.20
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.32
   AVERAGE FLOW DEPTH(FEET) =  0.70   TRAVEL TIME(MIN.) =   0.08
   Tc(MIN.) =   10.95
   SUBAREA AREA(ACRES) =     1.68      SUBAREA RUNOFF(CFS) =    3.46
   EFFECTIVE AREA(ACRES) =      6.73     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       6.7       PEAK FLOW RATE(CFS) =      13.88

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.74   FLOW VELOCITY(FEET/SEC.) =   8.51
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40305.00 =    889.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40305.00 TO NODE  40306.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    548.00  DOWNSTREAM(FEET) =    515.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   217.00   CHANNEL SLOPE = 0.1521
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.532
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap        SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)   (DECIMAL)    CN
   USER-DEFINED               -        4.67       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) =      18.57
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.10
   AVERAGE FLOW DEPTH(FEET) =  0.87   TRAVEL TIME(MIN.) =   0.45
   Tc(MIN.) =   11.40
   SUBAREA AREA(ACRES) =     4.67      SUBAREA RUNOFF(CFS) =    9.39
   EFFECTIVE AREA(ACRES) =     11.41     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      11.4       PEAK FLOW RATE(CFS) =      22.91

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.95   FLOW VELOCITY(FEET/SEC.) =   8.48
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40306.00 =   1106.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40306.00 TO NODE  40307.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    515.00  DOWNSTREAM(FEET) =    502.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE = 0.0722
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   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.479
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED                 -       8.44      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) =      31.19
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.94
   AVERAGE FLOW DEPTH(FEET) = 1.22   TRAVEL TIME(MIN.) =  0.43
   Tc(MIN.) =  11.83
   SUBAREA AREA(ACRES) =      8.44      SUBAREA RUNOFF(CFS) =  16.54
   EFFECTIVE AREA(ACRES) =     19.84      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      19.8         PEAK FLOW RATE(CFS) =      38.91

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.33   FLOW VELOCITY(FEET/SEC.) =  7.33
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40307.00 =   1286.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40307.00 TO NODE  40308.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    502.00  DOWNSTREAM(FEET) =    469.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    553.00   CHANNEL SLOPE = 0.0597
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 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                 -      10.07      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) =      48.15
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.20
   AVERAGE FLOW DEPTH(FEET) = 1.49   TRAVEL TIME(MIN.) =  1.28
   Tc(MIN.) =  13.11
   SUBAREA AREA(ACRES) =     10.07      SUBAREA RUNOFF(CFS) =  18.47
   EFFECTIVE AREA(ACRES) =     29.92      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      29.9         PEAK FLOW RATE(CFS) =      54.85

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.57   FLOW VELOCITY(FEET/SEC.) =  7.45
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40308.00 =   1839.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40308.00 TO NODE  40309.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
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   ELEVATION DATA: UPSTREAM(FEET) =    469.00  DOWNSTREAM(FEET) =    433.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    631.00   CHANNEL SLOPE = 0.0571
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.206
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED                 -       9.09      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) =      62.64
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.57
   AVERAGE FLOW DEPTH(FEET) = 1.66   TRAVEL TIME(MIN.) =  1.39
   Tc(MIN.) =  14.50
   SUBAREA AREA(ACRES) =      9.09      SUBAREA RUNOFF(CFS) =  15.59
   EFFECTIVE AREA(ACRES) =     39.01      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      39.0         PEAK FLOW RATE(CFS) =      66.91

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.70   FLOW VELOCITY(FEET/SEC.) =  7.68
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40309.00 =   2470.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40309.00 TO NODE  40310.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    433.00  DOWNSTREAM(FEET) =    406.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    595.00   CHANNEL SLOPE = 0.0454
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.096
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED                 -      11.61      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) =      76.29
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.30
   AVERAGE FLOW DEPTH(FEET) = 1.87   TRAVEL TIME(MIN.) =  1.36
   Tc(MIN.) =  15.85
   SUBAREA AREA(ACRES) =     11.61      SUBAREA RUNOFF(CFS) =  18.76
   EFFECTIVE AREA(ACRES) =     50.62      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      50.6         PEAK FLOW RATE(CFS) =      81.80

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.92   FLOW VELOCITY(FEET/SEC.) =  7.41
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40310.00 =   3065.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40310.00 TO NODE  40311.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
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   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    406.00  DOWNSTREAM(FEET) =    353.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1122.00   CHANNEL SLOPE = 0.0472
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.962
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -       15.32      0.30      0.897     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.897
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      93.48
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.66
   AVERAGE FLOW DEPTH(FEET) =  1.80    TRAVEL TIME(MIN.) =   1.94
   Tc(MIN.) =  17.79
   SUBAREA AREA(ACRES) =    15.32       SUBAREA RUNOFF(CFS) =   23.34
   EFFECTIVE AREA(ACRES) =     65.94     AREA-AVERAGED Fm(INCH/HR) =   0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  0.98
   TOTAL AREA(ACRES) =        65.9       PEAK FLOW RATE(CFS) =      99.04

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.83   FLOW VELOCITY(FEET/SEC.) =   9.82
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40311.00 =   4187.00 FEET.

**********************************************************************************
   FLOW PROCESS FROM NODE  40311.00 TO NODE  40312.00 IS CODE = 51
----------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    353.00  DOWNSTREAM(FEET) =    337.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  712.00   CHANNEL SLOPE = 0.0225
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.871
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        7.65      0.30      0.850     -
   USER-DEFINED              -        4.40      0.30      1.000     -
   USER-DEFINED              -        0.89      0.30      0.100     -
   USER-DEFINED              -        6.82      0.30      0.850     -
   USER-DEFINED              -        5.04      0.30      1.000     -
   USER-DEFINED              -        1.11      0.30      1.000     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.885
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     117.77
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.77
   AVERAGE FLOW DEPTH(FEET) =  2.25    TRAVEL TIME(MIN.) =   1.53
   Tc(MIN.) =  19.32
   SUBAREA AREA(ACRES) =    25.91       SUBAREA RUNOFF(CFS) =   37.44
   EFFECTIVE AREA(ACRES) =     91.85     AREA-AVERAGED Fm(INCH/HR) =   0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  0.95
   TOTAL AREA(ACRES) =        91.8       PEAK FLOW RATE(CFS) =     131.12

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
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   DEPTH(FEET) = 2.35   FLOW VELOCITY(FEET/SEC.) =   7.95
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40312.00 =   4899.00 FEET.

**********************************************************************************
   FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
----------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==================================================================================
   MAINLINE Tc(MIN.) =   19.32
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.871
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        0.04      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) =    0.04       SUBAREA RUNOFF(CFS) =    0.06
   EFFECTIVE AREA(ACRES) =     91.89    AREA-AVERAGED Fm(INCH/HR) =   0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  0.95
   TOTAL AREA(ACRES) =        91.9       PEAK FLOW RATE(CFS) =     131.18

**********************************************************************************
   FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
----------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==================================================================================
   MAINLINE Tc(MIN.) =   19.32
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.871
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        1.17      0.30      0.850     -
   USER-DEFINED              -        0.01      0.30      1.000     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.851
   SUBAREA AREA(ACRES) =    1.18       SUBAREA RUNOFF(CFS) =    1.72
   EFFECTIVE AREA(ACRES) =     93.07    AREA-AVERAGED Fm(INCH/HR) =   0.28
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  0.95
   TOTAL AREA(ACRES) =        93.1       PEAK FLOW RATE(CFS) =     132.89

**********************************************************************************
   FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
----------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==================================================================================
   MAINLINE Tc(MIN.) =   19.32
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.871
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        0.18      0.30      1.000     -
   USER-DEFINED              -        4.59      0.30      1.000     -
   USER-DEFINED              -        4.27      0.30      0.850     -
   USER-DEFINED              -        3.00      0.30      1.000     -
   USER-DEFINED              -        0.16      0.30      1.000     -
   USER-DEFINED              -        0.22      0.30      0.100     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.932
```

```
 SUBAREA AREA(ACRES) =   12.42      SUBAREA RUNOFF(CFS) =   17.79
 EFFECTIVE AREA(ACRES) =    105.49   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.95
 TOTAL AREA(ACRES) =      105.5      PEAK FLOW RATE(CFS) =    150.69

******************************************************************************
 FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
 MAINLINE Tc(MIN.) =   19.32
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.871
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED               -        2.55      0.30     1.000     -
 USER-DEFINED               -       10.49      0.30     1.000     -
 USER-DEFINED               -        2.87      0.30     0.850     -
 USER-DEFINED               -        3.70      0.30     1.000     -
 USER-DEFINED               -        3.12      0.30     1.000     -
 USER-DEFINED               -        0.54      0.30     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.981
 SUBAREA AREA(ACRES) =   23.27      SUBAREA RUNOFF(CFS) =   33.02
 EFFECTIVE AREA(ACRES) =    128.76   AREA-AVERAGED Fm(INCH/HR) =  0.29
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.95
 TOTAL AREA(ACRES) =      128.8      PEAK FLOW RATE(CFS) =    183.71

******************************************************************************
 FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
 MAINLINE Tc(MIN.) =   19.32
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.871
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED               -        2.13      0.30     1.000     -
 USER-DEFINED               -        0.01      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) =    2.14      SUBAREA RUNOFF(CFS) =    3.03
 EFFECTIVE AREA(ACRES) =    130.90   AREA-AVERAGED Fm(INCH/HR) =  0.29
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.95
 TOTAL AREA(ACRES) =      130.9      PEAK FLOW RATE(CFS) =    186.74
==============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      130.9  TC(MIN.) =     19.32
 EFFECTIVE AREA(ACRES) =    130.90  AREA-AVERAGED Fm(INCH/HR)=  0.29
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.954
 PEAK FLOW RATE(CFS)   =      186.74
==============================================================================
==============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
_____
****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
              (c) Copyright 1983-2013 Advanced Engineering Software (aes)
              Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                         Analysis prepared by:

                       Michael Baker International
                      5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


   *************************** DESCRIPTION OF STUDY ***************************
 * RMV PA-4 WATERSHED 4 EXISTING CONDITION                                   *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                     *
 * 25-YR EV MARCH 2019 CCHIU                                                 *
   **************************************************************************

   FILE NAME: X40425EV.DAT
   TIME/DATE OF STUDY: 10:37 03/25/2019
 ==============================================================================
   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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40400.00 TO NODE  40401.00 IS CODE = 21
 --------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==============================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
   ELEVATION DATA: UPSTREAM(FEET) =   928.00  DOWNSTREAM(FEET) =    750.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.081
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.083
   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
   "CHAPARRAL,BROADLEAF"     -        0.75    0.30     1.000    0   8.08
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      1.88
   TOTAL AREA(ACRES) =       0.75   PEAK FLOW RATE(CFS) =       1.88

 ****************************************************************************
   FLOW PROCESS FROM NODE  40401.00 TO NODE  40402.00 IS CODE = 51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   750.00  DOWNSTREAM(FEET) =    710.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   107.00   CHANNEL SLOPE = 0.3738
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.032
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap    SCS
        LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
   USER-DEFINED              -        1.17    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) =     3.33
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.44
   AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   0.24
   Tc(MIN.) =   8.32
   SUBAREA AREA(ACRES) =     1.17      SUBAREA RUNOFF(CFS) =    2.89
   EFFECTIVE AREA(ACRES) =      1.93      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         1.9        PEAK FLOW RATE(CFS) =       4.74

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.45   FLOW VELOCITY(FEET/SEC.) =   7.96
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40402.00 =    434.00 FEET.

 ****************************************************************************
   FLOW PROCESS FROM NODE  40402.00 TO NODE  40403.00 IS CODE = 51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   710.00  DOWNSTREAM(FEET) =    675.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE = 0.2756
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.975
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp       Ap      SCS
     LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -       1.05    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) =      6.00
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.57
 AVERAGE FLOW DEPTH(FEET) =  0.51   TRAVEL TIME(MIN.) =  0.28
 Tc(MIN.) =   8.60
 SUBAREA AREA(ACRES) =    1.05      SUBAREA RUNOFF(CFS) =   2.52
 EFFECTIVE AREA(ACRES) =     2.97    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) =       7.16

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.55   FLOW VELOCITY(FEET/SEC.) =  7.99
 LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40403.00 =   561.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  40403.00 TO NODE  40404.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =    650.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   113.00   CHANNEL SLOPE = 0.2212
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.928
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp       Ap      SCS
     LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -       1.95    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) =      9.47
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.80
 AVERAGE FLOW DEPTH(FEET) =  0.64   TRAVEL TIME(MIN.) =  0.24
 Tc(MIN.) =   8.84
 SUBAREA AREA(ACRES) =    1.95      SUBAREA RUNOFF(CFS) =    4.61
 EFFECTIVE AREA(ACRES) =     4.92    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       4.9       PEAK FLOW RATE(CFS) =      11.65

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.68   FLOW VELOCITY(FEET/SEC.) =  8.30
 LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40404.00 =   674.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  40404.00 TO NODE  40405.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE = 0.1826
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 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             -       2.15    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) =     14.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.02
 AVERAGE FLOW DEPTH(FEET) =  0.77   TRAVEL TIME(MIN.) =  0.46
 Tc(MIN.) =   9.30
 SUBAREA AREA(ACRES) =    2.15      SUBAREA RUNOFF(CFS) =    4.92
 EFFECTIVE AREA(ACRES) =     7.07    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       7.1       PEAK FLOW RATE(CFS) =      16.19

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.80   FLOW VELOCITY(FEET/SEC.) =  8.35
 LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40405.00 =   893.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  40405.00 TO NODE  40406.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =    605.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    43.00   CHANNEL SLOPE = 0.1163
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.828
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp       Ap      SCS
     LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -       2.90    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) =     19.49
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.42
 AVERAGE FLOW DEPTH(FEET) =  0.94   TRAVEL TIME(MIN.) =  0.10
 Tc(MIN.) =   9.39
 SUBAREA AREA(ACRES) =    2.90      SUBAREA RUNOFF(CFS) =    6.60
 EFFECTIVE AREA(ACRES) =     9.97    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      10.0       PEAK FLOW RATE(CFS) =      22.69

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.99   FLOW VELOCITY(FEET/SEC.) =  7.64
 LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40406.00 =   936.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  40406.00 TO NODE  40407.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    602.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    52.00   CHANNEL SLOPE = 0.0577
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 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               -        4.51       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) =      27.77
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.18
   AVERAGE FLOW DEPTH(FEET) =  1.22    TRAVEL TIME(MIN.) =   0.14
   Tc(MIN.) =    9.53
   SUBAREA AREA(ACRES) =     4.51       SUBAREA RUNOFF(CFS) =   10.17
   EFFECTIVE AREA(ACRES) =     14.48      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      14.5         PEAK FLOW RATE(CFS) =      32.64

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.30   FLOW VELOCITY(FEET/SEC.) =  6.44
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40407.00 =    988.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40407.00 TO NODE  40408.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    602.00  DOWNSTREAM(FEET) =    559.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   533.00   CHANNEL SLOPE = 0.0807
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 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               -        5.99       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) =      38.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.65
   AVERAGE FLOW DEPTH(FEET) =  1.30    TRAVEL TIME(MIN.) =   1.16
   Tc(MIN.) =   10.69
   SUBAREA AREA(ACRES) =     5.99       SUBAREA RUNOFF(CFS) =   12.53
   EFFECTIVE AREA(ACRES) =     20.47      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      20.5         PEAK FLOW RATE(CFS) =      42.84

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.35   FLOW VELOCITY(FEET/SEC.) =  7.86
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40408.00 =   1521.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40408.00 TO NODE  40409.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    559.00  DOWNSTREAM(FEET) =    509.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   702.00   CHANNEL SLOPE = 0.0712
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.434
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp         Ap      SCS
         LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED               -        6.05       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) =      48.65
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.75
   AVERAGE FLOW DEPTH(FEET) =  1.45    TRAVEL TIME(MIN.) =   1.51
   Tc(MIN.) =   12.20
   SUBAREA AREA(ACRES) =     6.05       SUBAREA RUNOFF(CFS) =   11.62
   EFFECTIVE AREA(ACRES) =     26.51      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      26.5         PEAK FLOW RATE(CFS) =      50.94

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.48   FLOW VELOCITY(FEET/SEC.) =  7.80
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40409.00 =   2223.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40409.00 TO NODE  40447.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    509.00  DOWNSTREAM(FEET) =    482.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   440.00   CHANNEL SLOPE = 0.0614
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.330
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA        Fp         Ap      SCS
         LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED               -        6.09       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) =      56.50
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.58
   AVERAGE FLOW DEPTH(FEET) =  1.58    TRAVEL TIME(MIN.) =   0.97
   Tc(MIN.) =   13.17
   SUBAREA AREA(ACRES) =     6.09       SUBAREA RUNOFF(CFS) =   11.12
   EFFECTIVE AREA(ACRES) =     32.60      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      32.6         PEAK FLOW RATE(CFS) =      59.57

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.61   FLOW VELOCITY(FEET/SEC.) =  7.69
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =   2663.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 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.) =   13.17
   RAINFALL INTENSITY(INCH/HR) =    2.33
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap = 1.00
   EFFECTIVE STREAM AREA(ACRES) =      32.60
   TOTAL STREAM AREA(ACRES) =      32.60
   PEAK FLOW RATE(CFS) AT CONFLUENCE =       59.57

******************************************************************************
   FLOW PROCESS FROM NODE  40410.00 TO NODE  40411.00 IS CODE = 21
------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
   ELEVATION DATA: UPSTREAM(FEET) =   878.00  DOWNSTREAM(FEET) =     726.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.371
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.022
   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
   "CHAPARRAL,BROADLEAF"      -       0.69     0.30     1.000    0    8.37
   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) =       0.69   PEAK FLOW RATE(CFS) =       1.68

******************************************************************************
   FLOW PROCESS FROM NODE  40411.00 TO NODE  40412.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    726.00  DOWNSTREAM(FEET) =     687.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   101.00   CHANNEL SLOPE = 0.3861
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.974
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        0.91     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) =      2.78
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.08
   AVERAGE FLOW DEPTH(FEET) =   0.36    TRAVEL TIME(MIN.) =   0.24
   Tc(MIN.) =    8.61
   SUBAREA AREA(ACRES) =     0.91       SUBAREA RUNOFF(CFS) =    2.19
   EFFECTIVE AREA(ACRES) =      1.60      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
```

```
       TOTAL AREA(ACRES) =        1.6      PEAK FLOW RATE(CFS) =        3.84

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.41   FLOW VELOCITY(FEET/SEC.) =  7.72
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40412.00 =      430.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  40412.00 TO NODE  40413.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     687.00  DOWNSTREAM(FEET) =     658.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   153.00   CHANNEL SLOPE = 0.1895
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.896
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        0.96     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) =      4.96
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.25
   AVERAGE FLOW DEPTH(FEET) =   0.51    TRAVEL TIME(MIN.) =   0.41
   Tc(MIN.) =    9.02
   SUBAREA AREA(ACRES) =     0.96       SUBAREA RUNOFF(CFS) =    2.23
   EFFECTIVE AREA(ACRES) =      2.55      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) =        5.96

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.55   FLOW VELOCITY(FEET/SEC.) =  6.66
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40413.00 =      583.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  40413.00 TO NODE  40414.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     658.00  DOWNSTREAM(FEET) =     615.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE = 0.1741
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.793
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        2.51     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) =      8.78
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.02
   AVERAGE FLOW DEPTH(FEET) =   0.65    TRAVEL TIME(MIN.) =   0.59
   Tc(MIN.) =    9.60
   SUBAREA AREA(ACRES) =     2.51       SUBAREA RUNOFF(CFS) =    5.63
```

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  EFFECTIVE AREA(ACRES) =      5.06    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =          5.1         PEAK FLOW RATE(CFS) =        11.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.71   FLOW VELOCITY(FEET/SEC.) =   7.46
  LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40414.00 =      830.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40414.00 TO NODE  40415.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    567.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    414.00   CHANNEL SLOPE =   0.1159
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.641
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        4.38      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) =      15.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.99
  AVERAGE FLOW DEPTH(FEET) =   0.87    TRAVEL TIME(MIN.) =   0.99
  Tc(MIN.) =  10.59
  SUBAREA AREA(ACRES) =     4.38       SUBAREA RUNOFF(CFS) =      9.22
  EFFECTIVE AREA(ACRES) =      9.44    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =          9.4         PEAK FLOW RATE(CFS) =        19.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.94   FLOW VELOCITY(FEET/SEC.) =   7.45
  LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40415.00 =     1244.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40415.00 TO NODE  40416.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    567.00  DOWNSTREAM(FEET) =    538.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    301.00   CHANNEL SLOPE =   0.0963
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.550
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        7.77      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) =      27.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.52
  AVERAGE FLOW DEPTH(FEET) =   1.11    TRAVEL TIME(MIN.) =   0.67
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  Tc(MIN.) =  11.26
  SUBAREA AREA(ACRES) =     7.77       SUBAREA RUNOFF(CFS) =     15.73
  EFFECTIVE AREA(ACRES) =     17.21    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) =        34.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.21   FLOW VELOCITY(FEET/SEC.) =   7.95
  LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40416.00 =     1545.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40416.00 TO NODE  40417.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    538.00  DOWNSTREAM(FEET) =    529.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    116.00   CHANNEL SLOPE =   0.0776
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.519
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       16.20      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) =      51.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.06
  AVERAGE FLOW DEPTH(FEET) =   1.45    TRAVEL TIME(MIN.) =   0.24
  Tc(MIN.) =  11.50
  SUBAREA AREA(ACRES) =    16.20       SUBAREA RUNOFF(CFS) =     32.37
  EFFECTIVE AREA(ACRES) =     33.41    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         33.4         PEAK FLOW RATE(CFS) =        66.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.61   FLOW VELOCITY(FEET/SEC.) =   8.63
  LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40417.00 =     1661.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40417.00 TO NODE  40447.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    529.00  DOWNSTREAM(FEET) =    482.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    891.00   CHANNEL SLOPE =   0.0527
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.307
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       14.55      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) =      79.88
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     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.79
     AVERAGE FLOW DEPTH(FEET) =  1.85   TRAVEL TIME(MIN.) =   1.91
     Tc(MIN.) =   13.40
     SUBAREA AREA(ACRES) =    14.55      SUBAREA RUNOFF(CFS) =   26.28
     EFFECTIVE AREA(ACRES) =     47.96      AREA-AVERAGED Fm(INCH/HR) =   0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =       48.0        PEAK FLOW RATE(CFS) =       86.64

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) =  1.90   FLOW VELOCITY(FEET/SEC.) =   7.98
     LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40447.00 =    2552.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 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.) =   13.40
     RAINFALL INTENSITY(INCH/HR) =   2.31
     AREA-AVERAGED Fm(INCH/HR) =  0.30
     AREA-AVERAGED Fp(INCH/HR) =  0.30
     AREA-AVERAGED Ap =  1.00
     EFFECTIVE STREAM AREA(ACRES) =      47.96
     TOTAL STREAM AREA(ACRES) =      47.96
     PEAK FLOW RATE(CFS) AT CONFLUENCE =        86.64

     ** CONFLUENCE DATA **
     STREAM       Q      Tc    Intensity  Fp(Fm)     Ap     Ae     HEADWATER
     NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
       1        59.57  13.17   2.330   0.30( 0.30) 1.00     32.6   40400.00
       2        86.64  13.40   2.307   0.30( 0.30) 1.00     48.0   40410.00

     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       145.70  13.17   2.330   0.30( 0.30) 1.00     79.7   40400.00
       2       145.53  13.40   2.307   0.30( 0.30) 1.00     80.6   40410.00

     COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
     PEAK FLOW RATE(CFS) =        145.70    Tc(MIN.) =    13.17
     EFFECTIVE AREA(ACRES) =       79.73    AREA-AVERAGED Fm(INCH/HR) =  0.30
     AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =       80.6
     LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE =   10
---------------------------------------------------------------------------
     >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
     ======================================================================

*****************************************************************************
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```
     FLOW PROCESS FROM NODE  40420.00 TO NODE  40421.00 IS CODE =   21
---------------------------------------------------------------------------
     >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
     >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
     ======================================================================
     INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
     ELEVATION DATA: UPSTREAM(FEET) =   925.00 DOWNSTREAM(FEET) =    815.00

     Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
     SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.799
     * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.936
     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
     "CHAPARRAL,BROADLEAF"      -        0.31     0.30     1.000     0   8.80
     SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
     SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
     SUBAREA RUNOFF(CFS) =       0.73
     TOTAL AREA(ACRES) =        0.31   PEAK FLOW RATE(CFS) =        0.73

*****************************************************************************
     FLOW PROCESS FROM NODE  40421.00 TO NODE  40422.00 IS CODE =   51
---------------------------------------------------------------------------
     >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
     >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
     ======================================================================
     ELEVATION DATA: UPSTREAM(FEET) =    815.00 DOWNSTREAM(FEET) =    743.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =   123.00    CHANNEL SLOPE = 0.5854
     CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     * 10 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
     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
     TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.07
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.56
     AVERAGE FLOW DEPTH(FEET) =  0.23   TRAVEL TIME(MIN.) =   0.31
     Tc(MIN.) =    9.11
     SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =     0.69
     EFFECTIVE AREA(ACRES) =      0.60      AREA-AVERAGED Fm(INCH/HR) =   0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.40

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   7.10
     LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40422.00 =     444.00 FEET.

*****************************************************************************
     FLOW PROCESS FROM NODE  40422.00 TO NODE  40423.00 IS CODE =   51
---------------------------------------------------------------------------
     >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
     >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
     ======================================================================
     ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    665.00
```

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```
    CHANNEL LENGTH THRU SUBAREA(FEET) =   142.00   CHANNEL SLOPE = 0.5493
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.824
    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     -
    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) =       2.31
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.73
    AVERAGE FLOW DEPTH(FEET) =  0.32    TRAVEL TIME(MIN.) =   0.31
    Tc(MIN.) =    9.42
    SUBAREA AREA(ACRES) =      0.80       SUBAREA RUNOFF(CFS) =    1.82
    EFFECTIVE AREA(ACRES) =     1.40      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =        3.19

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.36   FLOW VELOCITY(FEET/SEC.) =  8.41
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40423.00 =    586.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40423.00 TO NODE  40424.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    665.00  DOWNSTREAM(FEET) =      630.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    99.00   CHANNEL SLOPE = 0.3535
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.786
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED             -          0.32      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) =       3.55
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.34
    AVERAGE FLOW DEPTH(FEET) =  0.40    TRAVEL TIME(MIN.) =   0.22
    Tc(MIN.) =    9.64
    SUBAREA AREA(ACRES) =      0.32       SUBAREA RUNOFF(CFS) =    0.71
    EFFECTIVE AREA(ACRES) =     1.72      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =        3.86

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.41   FLOW VELOCITY(FEET/SEC.) =  7.47
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40424.00 =    685.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40424.00 TO NODE  40425.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    615.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    35.00   CHANNEL SLOPE = 0.4286
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.776
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED             -          1.87      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) =       5.94
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.95
    AVERAGE FLOW DEPTH(FEET) =  0.47    TRAVEL TIME(MIN.) =   0.07
    Tc(MIN.) =    9.71
    SUBAREA AREA(ACRES) =      1.87       SUBAREA RUNOFF(CFS) =    4.16
    EFFECTIVE AREA(ACRES) =     3.59      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) =        8.00

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.52   FLOW VELOCITY(FEET/SEC.) =  9.73
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40425.00 =    720.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40425.00 TO NODE  40426.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    574.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   260.00   CHANNEL SLOPE = 0.1577
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.678
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED             -          1.19      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) =       9.27
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.92
    AVERAGE FLOW DEPTH(FEET) =  0.67    TRAVEL TIME(MIN.) =   0.63
    Tc(MIN.) =   10.33
    SUBAREA AREA(ACRES) =      1.19       SUBAREA RUNOFF(CFS) =    2.55
    EFFECTIVE AREA(ACRES) =     4.78      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =       10.23

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 0.70   FLOW VELOCITY(FEET/SEC.) =  7.02
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40426.00 =    980.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40426.00 TO NODE  40427.00 IS CODE = 51
--------------------------------------------------------------------------
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```
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =    533.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   322.00   CHANNEL SLOPE = 0.1273
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.566
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
        LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -        1.82     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) =      12.09
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.74
    AVERAGE FLOW DEPTH(FEET) =   0.77   TRAVEL TIME(MIN.) =   0.80
    Tc(MIN.) =   11.13
    SUBAREA AREA(ACRES) =     1.82        SUBAREA RUNOFF(CFS) =    3.71
    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) =     13.46

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.80   FLOW VELOCITY(FEET/SEC.) =   6.94
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40427.00 =   1302.00 FEET.

*******************************************************************************
    FLOW PROCESS FROM NODE  40427.00 TO NODE  40428.00 IS CODE =  51
------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    533.00  DOWNSTREAM(FEET) =    521.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE = 0.0750
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 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              -        6.79     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) =      20.22
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.32
    AVERAGE FLOW DEPTH(FEET) =   1.03   TRAVEL TIME(MIN.) =   0.42
    Tc(MIN.) =   11.55
    SUBAREA AREA(ACRES) =     6.79        SUBAREA RUNOFF(CFS) =   13.52
    EFFECTIVE AREA(ACRES) =     13.39     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) =     26.66

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.15   FLOW VELOCITY(FEET/SEC.) =   6.75
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40428.00 =   1462.00 FEET.

*******************************************************************************
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    FLOW PROCESS FROM NODE  40428.00 TO NODE  40429.00 IS CODE =  51
------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    521.00  DOWNSTREAM(FEET) =    508.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   221.00   CHANNEL SLOPE = 0.0588
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.443
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
        LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -        3.74     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) =      30.27
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.40
    AVERAGE FLOW DEPTH(FEET) =   1.26   TRAVEL TIME(MIN.) =   0.58
    Tc(MIN.) =   12.13
    SUBAREA AREA(ACRES) =     3.74        SUBAREA RUNOFF(CFS) =    7.22
    EFFECTIVE AREA(ACRES) =     17.13     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =       17.1        PEAK FLOW RATE(CFS) =     33.04

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.30   FLOW VELOCITY(FEET/SEC.) =   6.52
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40429.00 =   1683.00 FEET.

*******************************************************************************
    FLOW PROCESS FROM NODE  40429.00 TO NODE  40446.00 IS CODE =  51
------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    508.00  DOWNSTREAM(FEET) =    489.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   306.00   CHANNEL SLOPE = 0.0621
    CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.359
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
        LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -        0.99     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) =      33.96
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.70
    AVERAGE FLOW DEPTH(FEET) =   1.30   TRAVEL TIME(MIN.) =   0.76
    Tc(MIN.) =   12.89
    SUBAREA AREA(ACRES) =     0.99        SUBAREA RUNOFF(CFS) =    1.83
    EFFECTIVE AREA(ACRES) =     18.12     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =       18.1        PEAK FLOW RATE(CFS) =     33.59

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.29   FLOW VELOCITY(FEET/SEC.) =   6.68
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =    1989.00 FEET.
```

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********************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE =  10
------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==================================================================


********************************************************************
  FLOW PROCESS FROM NODE  40430.00 TO NODE  40431.00 IS CODE =  21
------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   302.00
  ELEVATION DATA: UPSTREAM(FEET) =   1035.00  DOWNSTREAM(FEET) =    875.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.870
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.130
  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
  "CHAPARRAL,BROADLEAF"      -        0.40      0.30     1.000     0    7.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      1.03
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =       1.03

********************************************************************
  FLOW PROCESS FROM NODE  40431.00 TO NODE  40432.00 IS CODE =  51
------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    875.00  DOWNSTREAM(FEET) =    800.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE = 0.4688
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 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
  USER-DEFINED               -        0.65      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) =      1.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.02
  AVERAGE FLOW DEPTH(FEET) =  0.29   TRAVEL TIME(MIN.) =   0.38
  Tc(MIN.) =    8.25
  SUBAREA AREA(ACRES) =     0.65      SUBAREA RUNOFF(CFS) =    1.60
  EFFECTIVE AREA(ACRES) =     1.05     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) =      2.60

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   FLOW VELOCITY(FEET/SEC.) =  7.56
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40432.00 =    462.00 FEET.
```

```
********************************************************************
  FLOW PROCESS FROM NODE  40432.00 TO NODE  40433.00 IS CODE =  51
------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    712.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE = 0.5867
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.990
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        1.08      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) =      3.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.09
  AVERAGE FLOW DEPTH(FEET) =  0.38   TRAVEL TIME(MIN.) =   0.27
  Tc(MIN.) =    8.52
  SUBAREA AREA(ACRES) =     1.08      SUBAREA RUNOFF(CFS) =    2.62
  EFFECTIVE AREA(ACRES) =     2.13     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       2.1        PEAK FLOW RATE(CFS) =       5.17

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   FLOW VELOCITY(FEET/SEC.) =  9.65
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40433.00 =    612.00 FEET.

********************************************************************
  FLOW PROCESS FROM NODE  40433.00 TO NODE  40434.00 IS CODE =  51
------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    712.00  DOWNSTREAM(FEET) =    657.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   120.00   CHANNEL SLOPE = 0.4583
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 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
  USER-DEFINED               -        1.98      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) =      7.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.71
  AVERAGE FLOW DEPTH(FEET) =  0.51   TRAVEL TIME(MIN.) =   0.21
  Tc(MIN.) =    8.73
  SUBAREA AREA(ACRES) =     1.98      SUBAREA RUNOFF(CFS) =    4.72
  EFFECTIVE AREA(ACRES) =     4.11     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       4.1        PEAK FLOW RATE(CFS) =       9.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.56   FLOW VELOCITY(FEET/SEC.) =  10.37
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40434.00 =    732.00 FEET.


*********************************************************************
   FLOW PROCESS FROM NODE  40434.00 TO NODE  40435.00 IS CODE =  51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    657.00  DOWNSTREAM(FEET) =    620.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  161.00   CHANNEL SLOPE = 0.2298
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.891
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        2.34     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) =    12.54
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.56
   AVERAGE FLOW DEPTH(FEET) =  0.70   TRAVEL TIME(MIN.) =  0.31
   Tc(MIN.) =    9.04
   SUBAREA AREA(ACRES) =    2.34     SUBAREA RUNOFF(CFS) =    5.46
   EFFECTIVE AREA(ACRES) =    6.46    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) =    15.05

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.75   FLOW VELOCITY(FEET/SEC.) =  8.91
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40435.00 =    893.00 FEET.


*********************************************************************
   FLOW PROCESS FROM NODE  40435.00 TO NODE  40445.00 IS CODE =  51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =    579.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  358.00   CHANNEL SLOPE = 0.1145
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.746
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        1.75     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) =    16.98
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.06
   AVERAGE FLOW DEPTH(FEET) =  0.90   TRAVEL TIME(MIN.) =  0.85
   Tc(MIN.) =    9.89
   SUBAREA AREA(ACRES) =    1.75     SUBAREA RUNOFF(CFS) =    3.86
   EFFECTIVE AREA(ACRES) =    8.21    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       8.2        PEAK FLOW RATE(CFS) =    18.08
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.91   FLOW VELOCITY(FEET/SEC.) =  7.23
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40445.00 =   1251.00 FEET.


*********************************************************************
   FLOW PROCESS FROM NODE  40445.00 TO NODE  40445.00 IS CODE =   1
----------------------------------------------------------------------------
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
   TOTAL NUMBER OF STREAMS = 2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
   TIME OF CONCENTRATION(MIN.) =    9.89
   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) =        8.21
   TOTAL STREAM AREA(ACRES) =         8.21
   PEAK FLOW RATE(CFS) AT CONFLUENCE =        18.08


*********************************************************************
   FLOW PROCESS FROM NODE  40440.00 TO NODE  40441.00 IS CODE =  21
----------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  319.00
   ELEVATION DATA: UPSTREAM(FEET) =   1020.00  DOWNSTREAM(FEET) =    898.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.978
   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.)
   NATURAL FAIR COVER
   "CHAPARRAL,BROADLEAF"      -        0.75     0.30     1.000     0    8.59
   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) =       0.75  PEAK FLOW RATE(CFS) =      1.81


*********************************************************************
   FLOW PROCESS FROM NODE  40441.00 TO NODE  40442.00 IS CODE =  51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    898.00  DOWNSTREAM(FEET) =    760.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  253.00   CHANNEL SLOPE = 0.5455
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.880
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        0.89     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) =      2.84
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.16
 AVERAGE FLOW DEPTH(FEET) =   0.34    TRAVEL TIME(MIN.) =   0.52
 Tc(MIN.) =    9.10
 SUBAREA AREA(ACRES) =      0.89      SUBAREA RUNOFF(CFS) =    2.06
 EFFECTIVE AREA(ACRES) =      1.64      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =         1.6        PEAK FLOW RATE(CFS) =        3.80

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38    FLOW VELOCITY(FEET/SEC.) =  8.84
 LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40442.00 =    572.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  40442.00 TO NODE  40443.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    760.00 DOWNSTREAM(FEET) =     653.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   188.00   CHANNEL SLOPE = 0.5691
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.824
 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) =      5.85
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.84
 AVERAGE FLOW DEPTH(FEET) =   0.45    TRAVEL TIME(MIN.) =   0.32
 Tc(MIN.) =    9.42
 SUBAREA AREA(ACRES) =      1.80      SUBAREA RUNOFF(CFS) =    4.10
 EFFECTIVE AREA(ACRES) =      3.44      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =         3.4        PEAK FLOW RATE(CFS) =        7.82

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49    FLOW VELOCITY(FEET/SEC.) =  10.72
 LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40443.00 =    760.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  40443.00 TO NODE  40444.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    653.00 DOWNSTREAM(FEET) =     605.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   198.00   CHANNEL SLOPE = 0.2424
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.759
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
```

```
      LAND USE          GROUP   (ACRES)   (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED            -        3.16       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) =     11.31
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.49
 AVERAGE FLOW DEPTH(FEET) =   0.67    TRAVEL TIME(MIN.) =   0.39
 Tc(MIN.) =    9.81
 SUBAREA AREA(ACRES) =      3.16      SUBAREA RUNOFF(CFS) =    6.99
 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) =       14.60

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.74    FLOW VELOCITY(FEET/SEC.) =  9.00
 LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40444.00 =    958.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  40444.00 TO NODE  40445.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    605.00 DOWNSTREAM(FEET) =     579.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   243.00   CHANNEL SLOPE = 0.1070
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.668
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
      LAND USE          GROUP   (ACRES)   (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED            -        1.67       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) =     16.39
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.81
 AVERAGE FLOW DEPTH(FEET) =   0.90    TRAVEL TIME(MIN.) =   0.59
 Tc(MIN.) =   10.40
 SUBAREA AREA(ACRES) =      1.67      SUBAREA RUNOFF(CFS) =    3.57
 EFFECTIVE AREA(ACRES) =      8.27      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =         8.3        PEAK FLOW RATE(CFS) =       17.63

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.92    FLOW VELOCITY(FEET/SEC.) =  6.97
 LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40445.00 =   1201.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  40445.00 TO NODE  40445.00 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.) =   10.40
 RAINFALL INTENSITY(INCH/HR) =   2.67
 AREA-AVERAGED Fm(INCH/HR) =  0.30
```

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      AREA-AVERAGED Fp(INCH/HR) =  0.30
      AREA-AVERAGED Ap =  1.00
      EFFECTIVE STREAM AREA(ACRES) =       8.27
      TOTAL STREAM AREA(ACRES) =       8.27
      PEAK FLOW RATE(CFS) AT CONFLUENCE =       17.63

      ** CONFLUENCE DATA **
      STREAM     Q      Tc   Intensity  Fp(Fm)    Ap     Ae    HEADWATER
      NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)   NODE
        1       18.08   9.89   2.746  0.30( 0.30) 1.00      8.2  40430.00
        2       17.63  10.40   2.668  0.30( 0.30) 1.00      8.3  40440.00

      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       35.39   9.89   2.746  0.30( 0.30) 1.00     16.1  40430.00
        2       35.12  10.40   2.668  0.30( 0.30) 1.00     16.5  40440.00

      COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
      PEAK FLOW RATE(CFS) =       35.39    Tc(MIN.) =      9.89
      EFFECTIVE AREA(ACRES) =       16.07   AREA-AVERAGED Fm(INCH/HR) =  0.30
      AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
      TOTAL AREA(ACRES) =        16.5
      LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40445.00 =    1251.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40445.00 TO NODE  40446.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =      579.00  DOWNSTREAM(FEET) =      489.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =     636.00   CHANNEL SLOPE =  0.1415
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.582
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
     LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED            -         3.79     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) =       39.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.44
  AVERAGE FLOW DEPTH(FEET) =  1.18   TRAVEL TIME(MIN.) =   1.12
  Tc(MIN.) =   11.01
  SUBAREA AREA(ACRES) =     3.79      SUBAREA RUNOFF(CFS) =    7.77
  EFFECTIVE AREA(ACRES) =      19.86     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      20.3        PEAK FLOW RATE(CFS) =      40.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.19   FLOW VELOCITY(FEET/SEC.) =   9.55
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40446.00 =   1887.00 FEET.
```

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*******************************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE = 11
-------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
===============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     Q      Tc   Intensity  Fp(Fm)    Ap     Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)   NODE
    1       40.79  11.01   2.582  0.30( 0.30) 1.00     19.9  40430.00
    2       40.41  11.53   2.515  0.30( 0.30) 1.00     20.3  40440.00
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40446.00 =   1887.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     Q      Tc   Intensity  Fp(Fm)    Ap     Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)   NODE
    1       33.59  12.89   2.359  0.30( 0.30) 1.00     18.1  40420.00
  LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =   1989.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM     Q      Tc   Intensity  Fp(Fm)    Ap     Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)   NODE
    1       72.59  11.01   2.582  0.30( 0.30) 1.00     35.3  40430.00
    2       72.73  11.53   2.515  0.30( 0.30) 1.00     36.5  40440.00
    3       71.16  12.89   2.359  0.30( 0.30) 1.00     38.4  40420.00
   TOTAL AREA(ACRES) =       38.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       72.73   Tc(MIN.) =   11.528
  EFFECTIVE AREA(ACRES) =       36.47   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        38.4
  LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =   1989.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE = 12
-------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
===============================================================================

*******************************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40447.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    489.00  DOWNSTREAM(FEET) =    482.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   167.00   CHANNEL SLOPE =  0.0419
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.467
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
     LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED            -         0.59     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) =       73.30
```

```
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.01
     AVERAGE FLOW DEPTH(FEET) =  1.87    TRAVEL TIME(MIN.) =   0.40
     Tc(MIN.) =   11.92
     SUBAREA AREA(ACRES) =       0.59       SUBAREA RUNOFF(CFS) =     1.15
     EFFECTIVE AREA(ACRES) =     37.07      AREA-AVERAGED Fm(INCH/HR) =   0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =        39.0       PEAK FLOW RATE(CFS) =      72.73
     NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) =  1.86   FLOW VELOCITY(FEET/SEC.) =   7.02
     LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40447.00 =    2156.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE = 11
-------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
=========================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity  Fp(Fm)     Ap     Ae    HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
     1       72.59  11.41   2.530   0.30( 0.30) 1.00     35.9   40430.00
     2       72.73  11.92   2.467   0.30( 0.30) 1.00     37.1   40440.00
     3       71.16  13.29   2.319   0.30( 0.30) 1.00     39.0   40420.00
  LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40447.00 =    2156.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity  Fp(Fm)     Ap     Ae    HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
     1      145.70  13.17   2.330   0.30( 0.30) 1.00     79.7   40400.00
     2      145.53  13.40   2.307   0.30( 0.30) 1.00     80.6   40410.00
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc    Intensity  Fp(Fm)     Ap     Ae    HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
     1      211.22  11.41   2.530   0.30( 0.30) 1.00    105.0   40430.00
     2      213.50  11.92   2.467   0.30( 0.30) 1.00    109.2   40440.00
     3      216.99  13.17   2.330   0.30( 0.30) 1.00    118.5   40400.00
     4      216.77  13.29   2.319   0.30( 0.30) 1.00    119.1   40420.00
     5      216.29  13.40   2.307   0.30( 0.30) 1.00    119.5   40410.00
    TOTAL AREA(ACRES) =      119.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      216.99  Tc(MIN.) =   13.172
  EFFECTIVE AREA(ACRES) =    118.55  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      119.5
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE = 12
-------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
=========================================================================

*************************************************************************
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     FLOW PROCESS FROM NODE  40447.00 TO NODE  40448.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    482.00 DOWNSTREAM(FEET) =    447.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    926.00   CHANNEL SLOPE = 0.0378
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.173
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL   AREA       Fp        Ap     SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        24.32     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) =     237.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.05
  AVERAGE FLOW DEPTH(FEET) =  2.96    TRAVEL TIME(MIN.) =   1.71
  Tc(MIN.) =   14.88
  SUBAREA AREA(ACRES) =    24.32       SUBAREA RUNOFF(CFS) =  41.00
  EFFECTIVE AREA(ACRES) =    142.86      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       143.9       PEAK FLOW RATE(CFS) =      240.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.97   FLOW VELOCITY(FEET/SEC.) =   9.09
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40448.00 =    3589.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40448.00 TO NODE  40449.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    447.00 DOWNSTREAM(FEET) =    433.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    443.00   CHANNEL SLOPE = 0.0316
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.109
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL   AREA       Fp        Ap     SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       108.49     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) =     329.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.17
  AVERAGE FLOW DEPTH(FEET) =  3.46    TRAVEL TIME(MIN.) =   0.81
  Tc(MIN.) =   15.68
  SUBAREA AREA(ACRES) =   108.49       SUBAREA RUNOFF(CFS) = 176.61
  EFFECTIVE AREA(ACRES) =    251.35      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       252.3       PEAK FLOW RATE(CFS) =      409.17

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.75   FLOW VELOCITY(FEET/SEC.) =   9.69
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40449.00 =    4032.00 FEET.
```

```
     ** PEAK FLOW RATE TABLE **
      STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
      NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)    NODE
         1     418.90  13.93   2.257    0.30( 0.30) 1.00    237.8    40430.00
         2     416.33  14.44   2.211    0.30( 0.30) 1.00    242.1    40440.00
         3     409.17  15.68   2.109    0.30( 0.30) 1.00    251.4    40400.00
         4     408.11  15.80   2.100    0.30( 0.30) 1.00    251.9    40420.00
         5     406.70  15.92   2.091    0.30( 0.30) 1.00    252.3    40410.00
      NEW PEAK FLOW DATA ARE:
      PEAK FLOW RATE(CFS) =     418.90  Tc(MIN.) =   13.93
      AREA-AVERAGED Fm(INCH/HR) = 0.30  AREA-AVERAGED Fp(INCH/HR) = 0.30
      AREA-AVERAGED Ap = 1.00  EFFECTIVE AREA(ACRES) =    237.80

*********************************************************************
   FLOW PROCESS FROM NODE  40449.00 TO NODE  40450.00 IS CODE =  51
   -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    433.00  DOWNSTREAM(FEET) =    398.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1065.00   CHANNEL SLOPE = 0.0329
   CHANNEL BASE(FEET) =    0.00  "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.108
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -       36.85     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) =    448.89
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.06
   AVERAGE FLOW DEPTH(FEET) =   3.86   TRAVEL TIME(MIN.) =   1.76
   Tc(MIN.) =   15.69
   SUBAREA AREA(ACRES) =    36.85      SUBAREA RUNOFF(CFS) =   59.96
   EFFECTIVE AREA(ACRES) =    274.65    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      289.2      PEAK FLOW RATE(CFS) =    446.96

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  3.85   FLOW VELOCITY(FEET/SEC.) = 10.06
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40450.00 =    5097.00 FEET.

     ** PEAK FLOW RATE TABLE **
      STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
      NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)    NODE
         1     446.96  15.69   2.108    0.30( 0.30) 1.00    274.6    40430.00
         2     444.24  16.20   2.070    0.30( 0.30) 1.00    278.9    40440.00
         3     436.56  17.46   1.983    0.30( 0.30) 1.00    288.2    40400.00
         4     435.49  17.57   1.976    0.30( 0.30) 1.00    288.8    40420.00
         5     434.03  17.70   1.968    0.30( 0.30) 1.00    289.2    40410.00
      NEW PEAK FLOW DATA ARE:
      PEAK FLOW RATE(CFS) =     446.96  Tc(MIN.) =   15.69
      AREA-AVERAGED Fm(INCH/HR) = 0.30  AREA-AVERAGED Fp(INCH/HR) = 0.30
      AREA-AVERAGED Ap = 1.00  EFFECTIVE AREA(ACRES) =    274.65

*********************************************************************
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   FLOW PROCESS FROM NODE  40450.00 TO NODE  40451.00 IS CODE =  51
   -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    398.00  DOWNSTREAM(FEET) =    386.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  401.00   CHANNEL SLOPE = 0.0299
   CHANNEL BASE(FEET) =    0.00  "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.058
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -       71.80     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) =    503.78
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.02
   AVERAGE FLOW DEPTH(FEET) =   4.09   TRAVEL TIME(MIN.) =   0.67
   Tc(MIN.) =   16.36
   SUBAREA AREA(ACRES) =    71.80      SUBAREA RUNOFF(CFS) = 113.64
   EFFECTIVE AREA(ACRES) =    346.45    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      361.0      PEAK FLOW RATE(CFS) =    548.32

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  4.23   FLOW VELOCITY(FEET/SEC.) = 10.22
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40451.00 =    5498.00 FEET.

     ** PEAK FLOW RATE TABLE **
      STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
      NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)    NODE
         1     548.32  16.36   2.058    0.30( 0.30) 1.00    346.5    40430.00
         2     543.63  16.87   2.022    0.30( 0.30) 1.00    350.7    40440.00
         3     531.54  18.13   1.940    0.30( 0.30) 1.00    360.0    40400.00
         4     530.11  18.25   1.933    0.30( 0.30) 1.00    360.6    40420.00
         5     528.27  18.37   1.926    0.30( 0.30) 1.00    361.0    40410.00
      NEW PEAK FLOW DATA ARE:
      PEAK FLOW RATE(CFS) =     548.32  Tc(MIN.) =   16.36
      AREA-AVERAGED Fm(INCH/HR) = 0.30  AREA-AVERAGED Fp(INCH/HR) = 0.30
      AREA-AVERAGED Ap = 1.00  EFFECTIVE AREA(ACRES) =    346.45

*****************************************************************************
   FLOW PROCESS FROM NODE  40451.00 TO NODE  40452.00 IS CODE =  51
   -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    386.00  DOWNSTREAM(FEET) =    358.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  957.00   CHANNEL SLOPE = 0.0293
   CHANNEL BASE(FEET) =    0.00  "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.973
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -       12.07     0.30     1.000      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
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 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     557.40
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 12.64
 AVERAGE FLOW DEPTH(FEET) =  3.83    TRAVEL TIME(MIN.) =   1.26
 Tc(MIN.) =  17.62
 SUBAREA AREA(ACRES) =    12.07      SUBAREA RUNOFF(CFS) =   18.17
 EFFECTIVE AREA(ACRES) =    358.52      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =     373.1        PEAK FLOW RATE(CFS) =     548.32
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  3.81    FLOW VELOCITY(FEET/SEC.) = 12.58
 LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40452.00 =    6455.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc    Intensity  Fp(Fm)    Ap      Ae     HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
     1      548.32  17.62   1.973   0.30( 0.30) 1.00    358.5   40430.00
     2      543.63  18.14   1.940   0.30( 0.30) 1.00    362.8   40440.00
     3      531.54  19.40   1.867   0.30( 0.30) 1.00    372.1   40400.00
     4      530.11  19.52   1.860   0.30( 0.30) 1.00    372.7   40420.00
     5      528.27  19.65   1.853   0.30( 0.30) 1.00    373.1   40410.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     548.32  Tc(MIN.) =   17.62
 AREA-AVERAGED Fm(INCH/HR) =   0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =      358.52

*****************************************************************************
 FLOW PROCESS FROM NODE  40452.00 TO NODE  40453.00 IS CODE =  51
-----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =     341.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   429.00    CHANNEL SLOPE = 0.0396
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
 * 10 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              -        0.27     0.30     0.500     -
 USER-DEFINED              -        1.96     0.30     1.000     -
 USER-DEFINED              -        0.96     0.30     1.000     -
 USER-DEFINED              -        0.38     0.30     1.000     -
 USER-DEFINED              -        0.18     0.30     1.000     -
 USER-DEFINED              -        1.69     0.30     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.975
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     552.35
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 14.12
 AVERAGE FLOW DEPTH(FEET) =  3.61    TRAVEL TIME(MIN.) =   0.51
 Tc(MIN.) =  18.13
 SUBAREA AREA(ACRES) =     5.44      SUBAREA RUNOFF(CFS) =    8.07
 EFFECTIVE AREA(ACRES) =    363.96      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      378.5        PEAK FLOW RATE(CFS) =     548.32
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 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  3.60    FLOW VELOCITY(FEET/SEC.) = 14.07
 LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40453.00 =    6884.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc    Intensity  Fp(Fm)    Ap      Ae     HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
     1      548.32  18.13   1.941   0.30( 0.30) 1.00    364.0   40430.00
     2      543.63  18.64   1.910   0.30( 0.30) 1.00    368.2   40440.00
     3      531.54  19.91   1.839   0.30( 0.30) 1.00    377.5   40400.00
     4      530.11  20.03   1.833   0.30( 0.30) 1.00    378.1   40420.00
     5      528.27  20.16   1.826   0.30( 0.30) 1.00    378.5   40410.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     548.32  Tc(MIN.) =   18.13
 AREA-AVERAGED Fm(INCH/HR) =   0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =      363.96

*****************************************************************************
 FLOW PROCESS FROM NODE  40453.00 TO NODE  40453.00 IS CODE =  81
-----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
 MAINLINE Tc(MIN.) =   18.13
 * 10 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              -        0.18     0.30     1.000     -
 USER-DEFINED              -        5.30     0.30     0.850     -
 USER-DEFINED              -        0.64     0.30     1.000     -
 USER-DEFINED              -        2.08     0.30     1.000     -
 USER-DEFINED              -        0.67     0.30     0.100     -
 USER-DEFINED              -        0.29     0.30     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.847
 SUBAREA AREA(ACRES) =     9.16      SUBAREA RUNOFF(CFS) =   13.90
 EFFECTIVE AREA(ACRES) =    373.12      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      387.7        PEAK FLOW RATE(CFS) =     551.44

*****************************************************************************
 FLOW PROCESS FROM NODE  40453.00 TO NODE  40450.00 IS CODE =  81
-----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
 MAINLINE Tc(MIN.) =   18.13
 * 10 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              -        0.03     0.30     1.000     -
 USER-DEFINED              -        4.59     0.30     0.850     -
 USER-DEFINED              -        0.01     0.30     1.000     -
 USER-DEFINED              -        0.51     0.30     1.000     -
 USER-DEFINED              -        0.73     0.30     1.000     -
 USER-DEFINED              -        0.16     0.30     1.000     -
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.886
 SUBAREA AREA(ACRES) =    6.03     SUBAREA RUNOFF(CFS) =    9.09
 EFFECTIVE AREA(ACRES) =    379.15   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.99
 TOTAL AREA(ACRES) =      393.7      PEAK FLOW RATE(CFS) =     560.53

******************************************************************************
  FLOW PROCESS FROM NODE  40453.00 TO NODE  40453.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   18.13
  *  10 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              -        0.37      0.30      1.000      -
  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) =    0.87     SUBAREA RUNOFF(CFS) =    1.28
  EFFECTIVE AREA(ACRES) =    380.02   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      394.6      PEAK FLOW RATE(CFS) =     561.82
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)    =     394.6  TC(MIN.) =     18.13
  EFFECTIVE AREA(ACRES) =    380.02  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.994
  PEAK FLOW RATE(CFS)    =     561.82

  ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc    Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
     1     561.82  18.13   1.941   0.30( 0.30) 0.99    380.0   40430.00
     2     557.32  18.64   1.910   0.30( 0.30) 0.99    384.3   40440.00
     3     545.76  19.91   1.839   0.30( 0.30) 0.99    393.6   40400.00
     4     544.35  20.03   1.833   0.30( 0.30) 0.99    394.2   40420.00
     5     542.60  20.16   1.826   0.30( 0.30) 0.99    394.6   40410.00
==============================================================================

==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 _____
 **********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2013 Advanced Engineering Software (aes)
            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                      Michael Baker International
                    5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-4 WATERSHED 5 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 25-YR EV MARCH 2019 CCHIU                                            *
 **********************************************************************

  FILE NAME: X40525EV.DAT
  TIME/DATE OF STUDY: 10:35 03/25/2019
 ===========================================================================
  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  60.0    30.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40500.00 TO NODE  40501.00 IS CODE =  21
 ----------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ===========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   328.00
  ELEVATION DATA: UPSTREAM(FEET) =   961.00  DOWNSTREAM(FEET) =    845.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.819
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.933
  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
  "CHAPARRAL,BROADLEAF"     -       0.63     0.30     1.000    0   8.82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.49
  TOTAL AREA(ACRES) =        0.63   PEAK FLOW RATE(CFS) =      1.49

 **********************************************************************
  FLOW PROCESS FROM NODE  40501.00 TO NODE  40502.00 IS CODE =  51
 ----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   845.00  DOWNSTREAM(FEET) =    788.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  141.00   CHANNEL SLOPE = 0.4043
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.873
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap    SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -       1.11     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) =     2.78
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.32
  AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   0.32
  Tc(MIN.) =   9.14
  SUBAREA AREA(ACRES) =     1.11       SUBAREA RUNOFF(CFS) =    2.57
  EFFECTIVE AREA(ACRES) =      1.74     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =      4.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   FLOW VELOCITY(FEET/SEC.) =   8.03
  LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40502.00 =    469.00 FEET.

 **********************************************************************
  FLOW PROCESS FROM NODE  40502.00 TO NODE  40503.00 IS CODE =  51
 ----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   788.00  DOWNSTREAM(FEET) =    719.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  187.00   CHANNEL SLOPE = 0.3690
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.808
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
      LAND USE         GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED            -        1.44      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) =      5.66
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.33
 AVERAGE FLOW DEPTH(FEET) =  0.48    TRAVEL TIME(MIN.) =  0.37
 Tc(MIN.) =   9.51
 SUBAREA AREA(ACRES) =     1.44      SUBAREA RUNOFF(CFS) =    3.25
 EFFECTIVE AREA(ACRES) =     3.18     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) =       7.18

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.52   FLOW VELOCITY(FEET/SEC.) = 8.79
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40503.00 =    656.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40503.00 TO NODE  40504.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    719.00  DOWNSTREAM(FEET) =    545.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   302.00   CHANNEL SLOPE = 0.5762
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.737
  SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
      LAND USE         GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED            -        3.36      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) =     10.86
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.55
 AVERAGE FLOW DEPTH(FEET) =  0.56    TRAVEL TIME(MIN.) =  0.44
 Tc(MIN.) =   9.95
 SUBAREA AREA(ACRES) =     3.36      SUBAREA RUNOFF(CFS) =    7.37
 EFFECTIVE AREA(ACRES) =     6.54     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) =      14.34

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.62   FLOW VELOCITY(FEET/SEC.) = 12.40
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40504.00 =    958.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40504.00 TO NODE  40505.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    470.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   328.00   CHANNEL SLOPE = 0.2287
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.654
  SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
      LAND USE         GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED            -        9.58      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) =     24.49
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.01
 AVERAGE FLOW DEPTH(FEET) =  0.90    TRAVEL TIME(MIN.) =  0.55
 Tc(MIN.) =  10.50
 SUBAREA AREA(ACRES) =     9.58      SUBAREA RUNOFF(CFS) =   20.30
 EFFECTIVE AREA(ACRES) =    16.12     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       16.1       PEAK FLOW RATE(CFS) =      34.15

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.02   FLOW VELOCITY(FEET/SEC.) = 10.95
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40505.00 =   1286.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40505.00 TO NODE  40506.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    410.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   507.00   CHANNEL SLOPE = 0.1183
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.530
  SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/     SCS SOIL    AREA       Fp        Ap       SCS
      LAND USE         GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED            -       10.98      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) =     45.18
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.21
 AVERAGE FLOW DEPTH(FEET) =  1.28    TRAVEL TIME(MIN.) =  0.92
 Tc(MIN.) =  11.41
 SUBAREA AREA(ACRES) =    10.98      SUBAREA RUNOFF(CFS) =   22.04
 EFFECTIVE AREA(ACRES) =    27.10     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       27.1       PEAK FLOW RATE(CFS) =      54.39

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.38   FLOW VELOCITY(FEET/SEC.) = 9.57
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40506.00 =   1793.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40506.00 TO NODE  40507.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    355.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   698.00   CHANNEL SLOPE = 0.0788
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.369
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE             GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED                -        4.53      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) =     58.61
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.42
   AVERAGE FLOW DEPTH(FEET) = 1.52   TRAVEL TIME(MIN.) =  1.38
   Tc(MIN.) =   12.80
   SUBAREA AREA(ACRES) =     4.53      SUBAREA RUNOFF(CFS) =     8.44
   EFFECTIVE AREA(ACRES) =     31.63      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       31.6       PEAK FLOW RATE(CFS) =      58.92

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.53   FLOW VELOCITY(FEET/SEC.) =   8.40
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40507.00 =    2491.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40507.00 TO NODE  40518.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =     341.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   604.00   CHANNEL SLOPE =  0.0232
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 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
   USER-DEFINED                -        9.02      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) =     66.74
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.83
   AVERAGE FLOW DEPTH(FEET) = 1.81   TRAVEL TIME(MIN.) =  1.47
   Tc(MIN.) =   14.27
   SUBAREA AREA(ACRES) =     9.02      SUBAREA RUNOFF(CFS) =    15.64
   EFFECTIVE AREA(ACRES) =     40.66      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       40.7       PEAK FLOW RATE(CFS) =      70.48

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.84   FLOW VELOCITY(FEET/SEC.) =   6.91
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40518.00 =    3095.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40518.00 TO NODE  40518.00 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.) =   14.27
   RAINFALL INTENSITY(INCH/HR) =   2.23
   AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =       40.66
   TOTAL STREAM AREA(ACRES) =       40.66
   PEAK FLOW RATE(CFS) AT CONFLUENCE =        70.48

***************************************************************************
   FLOW PROCESS FROM NODE  40510.00 TO NODE  40511.00 IS CODE = 21
---------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
   ELEVATION DATA: UPSTREAM(FEET) =    851.00  DOWNSTREAM(FEET) =     735.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.835
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.929
   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
   "CHAPARRAL,BROADLEAF"       -        0.48      0.30     1.000      0   8.84
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =      1.13
   TOTAL AREA(ACRES) =       0.48   PEAK FLOW RATE(CFS) =       1.13

***************************************************************************
   FLOW PROCESS FROM NODE  40511.00 TO NODE  40512.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    735.00  DOWNSTREAM(FEET) =     650.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   116.00    CHANNEL SLOPE =  0.7328
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.887
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE             GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED                -        0.73      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) =      1.97
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.42
   AVERAGE FLOW DEPTH(FEET) = 0.28   TRAVEL TIME(MIN.) =  0.23
   Tc(MIN.) =    9.07
   SUBAREA AREA(ACRES) =     0.73      SUBAREA RUNOFF(CFS) =    1.69
   EFFECTIVE AREA(ACRES) =      1.20      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       1.2       PEAK FLOW RATE(CFS) =       2.80
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   FLOW VELOCITY(FEET/SEC.) = 8.92
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40512.00 =    445.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40512.00 TO NODE  40513.00 IS CODE = 51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   650.00  DOWNSTREAM(FEET) =    581.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  152.00   CHANNEL SLOPE = 0.4539
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.833
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        1.36     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) =      4.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.42
  AVERAGE FLOW DEPTH(FEET) =  0.41   TRAVEL TIME(MIN.) =  0.30
  Tc(MIN.) =  9.37
  SUBAREA AREA(ACRES) =   1.36       SUBAREA RUNOFF(CFS) =   3.10
  EFFECTIVE AREA(ACRES) =    2.56     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) =     5.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.46   FLOW VELOCITY(FEET/SEC.) = 9.09
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40513.00 =    597.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40513.00 TO NODE  40514.00 IS CODE = 51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   581.00  DOWNSTREAM(FEET) =    500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE = 0.4629
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.784
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        2.32     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) =      8.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.03
  AVERAGE FLOW DEPTH(FEET) =  0.53   TRAVEL TIME(MIN.) =  0.29
  Tc(MIN.) =  9.66
  SUBAREA AREA(ACRES) =   2.32       SUBAREA RUNOFF(CFS) =   5.18
  EFFECTIVE AREA(ACRES) =    4.88     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
```

```
  TOTAL AREA(ACRES) =       4.9       PEAK FLOW RATE(CFS) =      10.90

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.58   FLOW VELOCITY(FEET/SEC.) = 10.70
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40514.00 =    772.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40514.00 TO NODE  40515.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   500.00  DOWNSTREAM(FEET) =    440.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  206.00   CHANNEL SLOPE = 0.2913
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 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
   USER-DEFINED             -        2.15     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) =     13.25
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.45
  AVERAGE FLOW DEPTH(FEET) =  0.68   TRAVEL TIME(MIN.) =  0.36
  Tc(MIN.) =  10.02
  SUBAREA AREA(ACRES) =   2.15       SUBAREA RUNOFF(CFS) =   4.70
  EFFECTIVE AREA(ACRES) =    7.03     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       7.0       PEAK FLOW RATE(CFS) =      15.34

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.72   FLOW VELOCITY(FEET/SEC.) = 9.81
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40515.00 =    978.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40515.00 TO NODE  40516.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   440.00  DOWNSTREAM(FEET) =    390.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  269.00   CHANNEL SLOPE = 0.1859
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.651
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        5.24     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) =     20.89
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.95
  AVERAGE FLOW DEPTH(FEET) =  0.88   TRAVEL TIME(MIN.) =  0.50
  Tc(MIN.) =  10.52
  SUBAREA AREA(ACRES) =   5.24       SUBAREA RUNOFF(CFS) =   11.09
```

```
  EFFECTIVE AREA(ACRES) =     12.27    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      12.3       PEAK FLOW RATE(CFS) =      25.96

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.96   FLOW VELOCITY(FEET/SEC.) =   9.46
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40516.00 =   1247.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40516.00 TO NODE  40517.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    390.00  DOWNSTREAM(FEET) =    355.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    384.00   CHANNEL SLOPE =  0.0911
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  10 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
  USER-DEFINED            -        4.01     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) =      29.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.50
  AVERAGE FLOW DEPTH(FEET) =   1.15   TRAVEL TIME(MIN.) =   0.85
  Tc(MIN.) =   11.38
  SUBAREA AREA(ACRES) =    4.01       SUBAREA RUNOFF(CFS) =    8.07
  EFFECTIVE AREA(ACRES) =     16.28    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      16.3       PEAK FLOW RATE(CFS) =      32.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.19   FLOW VELOCITY(FEET/SEC.) =   7.67
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40517.00 =   1631.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40517.00 TO NODE  40518.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    341.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    512.00   CHANNEL SLOPE =  0.0273
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.379
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp       Ap      SCS
      LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED            -        8.89     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) =      41.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.42
  AVERAGE FLOW DEPTH(FEET) =   1.46   TRAVEL TIME(MIN.) =   1.33
```

```
  Tc(MIN.) =   12.70
  SUBAREA AREA(ACRES) =    8.89       SUBAREA RUNOFF(CFS) =   16.64
  EFFECTIVE AREA(ACRES) =     25.17    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      25.2       PEAK FLOW RATE(CFS) =      47.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.54   FLOW VELOCITY(FEET/SEC.) =   6.64
  LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40518.00 =   2143.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40518.00 TO NODE  40518.00 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.) =   12.70
  RAINFALL INTENSITY(INCH/HR) =   2.38
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     25.17
  TOTAL STREAM AREA(ACRES) =      25.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      47.11

  ** CONFLUENCE DATA **
  STREAM     Q      Tc    Intensity  Fp(Fm)     Ap    Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)  NODE
     1      70.48  14.27    2.226   0.30( 0.30) 1.00    40.7   40500.00
     2      47.11  12.70    2.379   0.30( 0.30) 1.00    25.2   40510.00

  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     114.84  12.70    2.379   0.30( 0.30) 1.00    61.4   40510.00
     2     114.11  14.27    2.226   0.30( 0.30) 1.00    65.8   40500.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     114.84    Tc(MIN.) =   12.70
  EFFECTIVE AREA(ACRES) =       61.37   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       65.8
  LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40518.00 =   3095.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  40518.00 TO NODE  40519.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    341.00  DOWNSTREAM(FEET) =    333.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    688.00   CHANNEL SLOPE =  0.0116
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
```

```
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *  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
  USER-DEFINED               -        3.34      0.30      1.000     -
  USER-DEFINED               -        2.15      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) =     119.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.08
  AVERAGE FLOW DEPTH(FEET) =  2.56   TRAVEL TIME(MIN.) =   1.89
  Tc(MIN.) =   14.59
  SUBAREA AREA(ACRES) =     5.49       SUBAREA RUNOFF(CFS) =     9.38
  EFFECTIVE AREA(ACRES) =     66.86     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        71.3       PEAK FLOW RATE(CFS) =     114.84
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.52   FLOW VELOCITY(FEET/SEC.) =   6.02
  LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40519.00 =    3783.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM      Q       Tc    Intensity   Fp(Fm)     Ap      Ae      HEADWATER
   NUMBER    (CFS)   (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)     NODE
      1     114.84   14.59    2.198   0.30( 0.30) 1.00     66.9   40510.00
      2     114.11   16.16    2.073   0.30( 0.30) 1.00     71.3   40500.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     114.84  Tc(MIN.) =    14.59
  AREA-AVERAGED Fm(INCH/HR) =  0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =       66.86

*******************************************************************************
  FLOW PROCESS FROM NODE  40519.00 TO NODE  40519.00 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
  USER-DEFINED               -        0.35      0.30      0.500     -
  USER-DEFINED               -        4.48      0.30      1.000     -
  USER-DEFINED               -        0.38      0.30      1.000     -
  USER-DEFINED               -        1.49      0.30      1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.974
  SUBAREA AREA(ACRES) =     6.70       SUBAREA RUNOFF(CFS) =    11.49
  EFFECTIVE AREA(ACRES) =     73.56     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        78.0       PEAK FLOW RATE(CFS) =     125.68
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        78.0  TC(MIN.) =     14.59
  EFFECTIVE AREA(ACRES) =      73.56  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.998
```

```
  PEAK FLOW RATE(CFS)   =       125.68

  ** PEAK FLOW RATE TABLE **
   STREAM      Q       Tc    Intensity   Fp(Fm)     Ap      Ae      HEADWATER
   NUMBER    (CFS)   (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)     NODE
      1     125.68   14.59    2.198   0.30( 0.30) 1.00     73.6   40510.00
      2     124.54   16.16    2.073   0.30( 0.30) 1.00     78.0   40500.00
===============================================================================
===============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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_____
*************************************************************************
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             (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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                          Analysis prepared by:

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  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-4 WATERSHED 6 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 25-YR EV MARCH 2019 CCHIU                                            *
  *********************************************************************

   FILE NAME: X40625EV.DAT
   TIME/DATE OF STUDY: 10:35 03/25/2019
==============================================================================
   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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40600.00 TO NODE  40601.00 IS CODE =  21
 --------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   279.00
   ELEVATION DATA: UPSTREAM(FEET) =   1054.00  DOWNSTREAM(FEET) =   1000.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.326
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.840
   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"             -         0.54      0.30     1.000    0    9.33
   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) =       0.54   PEAK FLOW RATE(CFS) =       1.24

*************************************************************************
   FLOW PROCESS FROM NODE  40601.00 TO NODE  40602.00 IS CODE =  51
 --------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    985.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   199.00   CHANNEL SLOPE = 0.0754
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.690
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap     SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -         0.76      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) =     2.06
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.58
   AVERAGE FLOW DEPTH(FEET) =   0.44    TRAVEL TIME(MIN.) =   0.93
   Tc(MIN.) =   10.25
   SUBAREA AREA(ACRES) =     0.76       SUBAREA RUNOFF(CFS) =    1.63
   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) =      2.80

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.49   FLOW VELOCITY(FEET/SEC.) =   3.87
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40602.00 =    478.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40602.00 TO NODE  40603.00 IS CODE =  51
 --------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    985.00  DOWNSTREAM(FEET) =    958.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   282.00   CHANNEL SLOPE = 0.0957
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.549
   SUBAREA LOSS RATE DATA(AMC  II):
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 DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)   CN
 USER-DEFINED              -        1.11     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) =      3.93
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.64
 AVERAGE FLOW DEPTH(FEET) =  0.53   TRAVEL TIME(MIN.) =   1.01
 Tc(MIN.) =   11.27
 SUBAREA AREA(ACRES) =     1.11      SUBAREA RUNOFF(CFS) =    2.25
 EFFECTIVE AREA(ACRES) =      2.41    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         2.4      PEAK FLOW RATE(CFS) =       4.88

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.58   FLOW VELOCITY(FEET/SEC.) =  4.89
 LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40603.00 =    760.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40603.00 TO NODE  40604.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    958.00  DOWNSTREAM(FEET) =    940.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE =  0.0822
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 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              -        0.36     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) =      5.23
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.64
 AVERAGE FLOW DEPTH(FEET) =  0.61   TRAVEL TIME(MIN.) =   0.79
 Tc(MIN.) =   12.05
 SUBAREA AREA(ACRES) =     0.36      SUBAREA RUNOFF(CFS) =    0.69
 EFFECTIVE AREA(ACRES) =      2.77    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         2.8      PEAK FLOW RATE(CFS) =       5.37

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.62   FLOW VELOCITY(FEET/SEC.) =  4.73
 LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40604.00 =    979.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40604.00 TO NODE  40605.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    940.00  DOWNSTREAM(FEET) =    800.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   547.00   CHANNEL SLOPE =  0.2559
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

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* 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              -        3.00     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) =      8.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.95
 AVERAGE FLOW DEPTH(FEET) =  0.58   TRAVEL TIME(MIN.) =   1.15
 Tc(MIN.) =   13.20
 SUBAREA AREA(ACRES) =     3.00      SUBAREA RUNOFF(CFS) =    5.47
 EFFECTIVE AREA(ACRES) =      5.77    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) =      10.53

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.64   FLOW VELOCITY(FEET/SEC.) =  8.47
 LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40605.00 =   1526.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40605.00 TO NODE  40606.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    680.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   277.00   CHANNEL SLOPE =  0.4332
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.286
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)   CN
 USER-DEFINED              -        2.22     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) =     12.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.82
 AVERAGE FLOW DEPTH(FEET) =  0.62   TRAVEL TIME(MIN.) =   0.43
 Tc(MIN.) =   13.63
 SUBAREA AREA(ACRES) =     2.22      SUBAREA RUNOFF(CFS) =    3.97
 EFFECTIVE AREA(ACRES) =      7.99    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =         8.0      PEAK FLOW RATE(CFS) =      14.28

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.65   FLOW VELOCITY(FEET/SEC.) = 11.15
 LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40606.00 =   1803.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40606.00 TO NODE  40607.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    680.00  DOWNSTREAM(FEET) =    670.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    59.00   CHANNEL SLOPE =  0.1695
```

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   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.275
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP      (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -          9.34      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) =     22.58
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.78
   AVERAGE FLOW DEPTH(FEET) =  0.93   TRAVEL TIME(MIN.) =   0.11
   Tc(MIN.) =   13.74
   SUBAREA AREA(ACRES) =      9.34       SUBAREA RUNOFF(CFS) =   16.59
   EFFECTIVE AREA(ACRES) =     17.33      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =    0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      17.3          PEAK FLOW RATE(CFS) =     30.80

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.04   FLOW VELOCITY(FEET/SEC.) = 9.48
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40607.00 =   1862.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40607.00 TO NODE  40608.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   670.00  DOWNSTREAM(FEET) =    585.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   246.00   CHANNEL SLOPE = 0.3455
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.245
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP      (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -          4.64      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) =     34.86
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 12.85
   AVERAGE FLOW DEPTH(FEET) =  0.95   TRAVEL TIME(MIN.) =   0.32
   Tc(MIN.) =   14.06
   SUBAREA AREA(ACRES) =      4.64       SUBAREA RUNOFF(CFS) =    8.11
   EFFECTIVE AREA(ACRES) =     21.96      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =    0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      22.0          PEAK FLOW RATE(CFS) =     38.45

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.99   FLOW VELOCITY(FEET/SEC.) = 13.15
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40608.00 =   2108.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40608.00 TO NODE  40609.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =   585.00  DOWNSTREAM(FEET) =    494.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   482.00   CHANNEL SLOPE = 0.1888
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.181
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP      (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -          8.61      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) =     45.74
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.96
   AVERAGE FLOW DEPTH(FEET) =  1.18   TRAVEL TIME(MIN.) =   0.73
   Tc(MIN.) =   14.79
   SUBAREA AREA(ACRES) =      8.61       SUBAREA RUNOFF(CFS) =   14.58
   EFFECTIVE AREA(ACRES) =     30.57      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =    0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      30.6          PEAK FLOW RATE(CFS) =     51.75

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.23   FLOW VELOCITY(FEET/SEC.) = 11.35
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40609.00 =   2590.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40609.00 TO NODE  40610.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   494.00  DOWNSTREAM(FEET) =    470.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   236.00   CHANNEL SLOPE = 0.1017
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.147
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP      (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         18.33      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) =     66.98
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.55
   AVERAGE FLOW DEPTH(FEET) =  1.53   TRAVEL TIME(MIN.) =   0.41
   Tc(MIN.) =   15.20
   SUBAREA AREA(ACRES) =     18.33       SUBAREA RUNOFF(CFS) =   30.47
   EFFECTIVE AREA(ACRES) =     48.90      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =    0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      48.9          PEAK FLOW RATE(CFS) =     81.28

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.64   FLOW VELOCITY(FEET/SEC.) = 10.03
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40610.00 =   2826.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40610.00 TO NODE  40611.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
     >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ===================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    425.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  560.00   CHANNEL SLOPE = 0.0804
    CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
    * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.070
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE             GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED                -       10.11      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) =     89.33
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.39
    AVERAGE FLOW DEPTH(FEET) =  1.78   TRAVEL TIME(MIN.) =  0.99
    Tc(MIN.) =  16.20
    SUBAREA AREA(ACRES) =   10.11      SUBAREA RUNOFF(CFS) =  16.10
    EFFECTIVE AREA(ACRES) =    59.01     AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =     59.0       PEAK FLOW RATE(CFS) =    94.02

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 1.81   FLOW VELOCITY(FEET/SEC.) =  9.54
    LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40611.00 =   3386.00 FEET.
*************************************************************************
  FLOW PROCESS FROM NODE  40611.00 TO NODE  40612.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ===================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    425.00  DOWNSTREAM(FEET) =    373.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =  906.00   CHANNEL SLOPE = 0.0574
    CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
    * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.953
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE             GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED                -       20.87      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) =    109.55
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.71
    AVERAGE FLOW DEPTH(FEET) =  2.05   TRAVEL TIME(MIN.) =  1.73
    Tc(MIN.) =  17.93
    SUBAREA AREA(ACRES) =   20.87      SUBAREA RUNOFF(CFS) =  31.05
    EFFECTIVE AREA(ACRES) =    79.89     AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =     79.9       PEAK FLOW RATE(CFS) =    118.85

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 2.11   FLOW VELOCITY(FEET/SEC.) =  8.91
    LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40612.00 =   4292.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40612.00 TO NODE  40613.00 IS CODE = 51
```

```
  -------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ===================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    373.00  DOWNSTREAM(FEET) =    328.00
    CHANNEL LENGTH THRU SUBAREA(FEET) = 1192.00   CHANNEL SLOPE = 0.0378
    CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
    * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.834
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE             GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED                -        0.04      0.30      1.000      -
    USER-DEFINED                -        0.14      0.30      1.000      -
    USER-DEFINED                -        0.96      0.30      1.000      -
    USER-DEFINED                -        0.21      0.30      1.000      -
    USER-DEFINED                -        0.71      0.30      1.000      -
    USER-DEFINED                -        3.41      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) =    122.62
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.52
    AVERAGE FLOW DEPTH(FEET) =  2.07   TRAVEL TIME(MIN.) =  2.09
    Tc(MIN.) =  20.02
    SUBAREA AREA(ACRES) =    5.47      SUBAREA RUNOFF(CFS) =   7.55
    EFFECTIVE AREA(ACRES) =    85.36     AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =     85.4       PEAK FLOW RATE(CFS) =    118.85
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 2.05   FLOW VELOCITY(FEET/SEC.) =  9.45
    LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40613.00 =   5484.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40613.00 TO NODE  40613.00 IS CODE = 81
-------------------------------------------------------------------------
    >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
  ===================================================================
    MAINLINE Tc(MIN.) =  20.02
    * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.834
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE             GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
    USER-DEFINED                -        0.07      0.30      1.000      -
    USER-DEFINED                -        0.69      0.30      1.000      -
    USER-DEFINED                -        0.99      0.30      1.000      -
    USER-DEFINED                -        4.13      0.30      1.000      -
    USER-DEFINED                -        0.72      0.30      1.000      -
    USER-DEFINED                -        0.26      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) =    6.86      SUBAREA RUNOFF(CFS) =   9.47
    EFFECTIVE AREA(ACRES) =    92.22   AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =     92.2       PEAK FLOW RATE(CFS) =    127.28

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

```
FLOW PROCESS FROM NODE  40613.00 TO NODE  40613.00 IS CODE =  81
------------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
MAINLINE Tc(MIN.) =   20.02
*  10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.834
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
USER-DEFINED              -         6.92      0.30     1.000     -
USER-DEFINED              -         2.35      0.30     1.000     -
USER-DEFINED              -         0.47      0.30     1.000     -
USER-DEFINED              -         3.66      0.30     1.000     -
USER-DEFINED              -         0.31      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) =   13.71      SUBAREA RUNOFF(CFS) =   18.92
EFFECTIVE AREA(ACRES) =    105.93  AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =      105.9     PEAK FLOW RATE(CFS) =    146.20
==============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      105.9  TC(MIN.) =     20.02
EFFECTIVE AREA(ACRES) =    105.93  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)   =     146.20
==============================================================================
==============================================================================
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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                        Analysis prepared by:

                      Michael Baker International
                     5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY ************************
 * RMV PA-3 WATERSHED 3 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 50-YR EV MARCH 2019 CCHIU                                          *
 **********************************************************************

  FILE NAME: X30350EV.DAT
  TIME/DATE OF STUDY: 08:01 03/25/2019
=====================================================================
   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;  0.170
  *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  60.0    30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  30300.00 TO NODE  30301.00 IS CODE =  21
---------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
  ELEVATION DATA: UPSTREAM(FEET) =   622.00  DOWNSTREAM(FEET) =    551.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.676
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.103
  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
  "CHAPARRAL,NARROWLEAF"     -          1.80      0.30      1.000    0    9.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       4.54
  TOTAL AREA(ACRES) =        1.80    PEAK FLOW RATE(CFS) =       4.54

*********************************************************************
  FLOW PROCESS FROM NODE  30301.00 TO NODE  30302.00 IS CODE =  51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    551.00  DOWNSTREAM(FEET) =    508.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 2187.00   CHANNEL SLOPE = 0.0197
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  1.974
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp        Ap     SCS
       LAND USE             GROUP     (ACRES)   (INCH/HR) (DECIMAL)  CN
  USER-DEFINED                -         6.70      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) =       9.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.17
  AVERAGE FLOW DEPTH(FEET) =   1.01    TRAVEL TIME(MIN.) =  11.49
  Tc(MIN.) =   21.16
  SUBAREA AREA(ACRES) =      6.70       SUBAREA RUNOFF(CFS) =   10.10
  EFFECTIVE AREA(ACRES) =       8.50       AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        8.5         PEAK FLOW RATE(CFS) =      12.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  1.12   FLOW VELOCITY(FEET/SEC.) =   3.41
   LONGEST FLOWPATH FROM NODE  30300.00 TO NODE  30302.00 =    2512.00 FEET.
================================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =        8.5  TC(MIN.) =     21.16
   EFFECTIVE AREA(ACRES) =      8.50  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)    =       12.81
================================================================================
================================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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

                       Michael Baker International
                     5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


  ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 4A EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 50-YR EV MARCH 2019 CCHIU                                              *
  ***********************************************************************

  FILE NAME: X34A50EV.DAT
  TIME/DATE OF STUDY: 07:30 03/25/2019
================================================================================
   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
  *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; 0.170
  *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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  30400.00 TO NODE  30401.00 IS CODE =  21
 ------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
   ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    580.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.150
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.539
   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.)
   AGRICULTURAL POOR COVER
   "ROW CROPS,STRAIGHT ROW"   -        0.26     0.30     1.000     0    8.15
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =        0.75
   TOTAL AREA(ACRES) =        0.26   PEAK FLOW RATE(CFS) =        0.75


 ********************************************************************************
   FLOW PROCESS FROM NODE  30401.00 TO NODE  30402.00 IS CODE =  51
 ------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    580.00  DOWNSTREAM(FEET) =    540.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   220.00   CHANNEL SLOPE = 0.1818
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  15 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                -        0.40     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) =        1.28
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.46
   AVERAGE FLOW DEPTH(FEET) =  0.31    TRAVEL TIME(MIN.) =   0.82
   Tc(MIN.) =    8.97
   SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    1.07
   EFFECTIVE AREA(ACRES) =       0.65       AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       1.77

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   4.86
   LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30402.00 =    536.00 FEET.


  **********************************************************************
   FLOW PROCESS FROM NODE  30402.00 TO NODE  30403.00 IS CODE =  51
  ----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    491.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  151.00   CHANNEL SLOPE = 0.3245
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.198
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        0.12     0.30      1.000     -
   USER-DEFINED              -        0.86     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) =     3.04
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.80
   AVERAGE FLOW DEPTH(FEET) =  0.39   TRAVEL TIME(MIN.) =   0.37
   Tc(MIN.) =   9.34
   SUBAREA AREA(ACRES) =    0.98      SUBAREA RUNOFF(CFS) =    2.56
   EFFECTIVE AREA(ACRES) =     1.63     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       1.6        PEAK FLOW RATE(CFS) =     4.26

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.44   FLOW VELOCITY(FEET/SEC.) =   7.41
   LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30403.00 =    687.00 FEET.


  **********************************************************************
   FLOW PROCESS FROM NODE  30403.00 TO NODE  30404.00 IS CODE =  51
  ----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    491.00  DOWNSTREAM(FEET) =    473.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  170.00   CHANNEL SLOPE = 0.1059
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.048
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        1.00     0.30      1.000     -
   USER-DEFINED              -        1.00     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) =     6.73
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.42
   AVERAGE FLOW DEPTH(FEET) =  0.64   TRAVEL TIME(MIN.) =   0.52
   Tc(MIN.) =   9.87
   SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    4.95
   EFFECTIVE AREA(ACRES) =     3.63     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) =      8.99

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.71   FLOW VELOCITY(FEET/SEC.) =   5.87
   LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30404.00 =    857.00 FEET.

  *************************************************************************
   FLOW PROCESS FROM NODE  30404.00 TO NODE  30405.00 IS CODE =  51
  -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  =========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    473.00  DOWNSTREAM(FEET) =    430.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  289.00   CHANNEL SLOPE = 0.1488
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.963
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       20.80     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) =    33.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.32
   AVERAGE FLOW DEPTH(FEET) =  1.10   TRAVEL TIME(MIN.) =   0.52
   Tc(MIN.) =  10.38
   SUBAREA AREA(ACRES) =   20.80      SUBAREA RUNOFF(CFS) =   49.84
   EFFECTIVE AREA(ACRES) =    24.43     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       24.4        PEAK FLOW RATE(CFS) =     58.55

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.35   FLOW VELOCITY(FEET/SEC.) = 10.66
   LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30405.00 =   1146.00 FEET.
  =========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =       24.4  TC(MIN.) =      10.38
   EFFECTIVE AREA(ACRES) =     24.43  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)    =       58.55
  =========================================================================
  =========================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
********************************************************************
           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                      Michael Baker International
                     5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY ************************
 * RMV PA-3 WATERSHED 4B EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 50-YR EV MARCH 2019 CCHIU                                          *
  ********************************************************************

  FILE NAME: X34B50EV.DAT
  TIME/DATE OF STUDY: 11:01 03/26/2019
 ====================================================================
   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;  0.170
  *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  60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
```

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```
  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  30410.00 TO NODE  30411.00 IS CODE =  21
 --------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ====================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
   ELEVATION DATA: UPSTREAM(FEET) =   615.00  DOWNSTREAM(FEET) =   558.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   7.546
   * 15 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.)
   AGRICULTURAL POOR COVER
   "ROW CROPS,STRAIGHT ROW"  -        0.59    0.30    1.000    0    7.55
   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) =       0.59   PEAK FLOW RATE(CFS) =      1.81


 ********************************************************************
   FLOW PROCESS FROM NODE  30411.00 TO NODE  30412.00 IS CODE =  51
 --------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   558.00  DOWNSTREAM(FEET) =   534.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   137.00   CHANNEL SLOPE = 0.1752
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.593
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA     Fp       Ap     SCS
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
   USER-DEFINED              -        0.85    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) =      3.07
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.48
   AVERAGE FLOW DEPTH(FEET) =  0.43   TRAVEL TIME(MIN.) =   0.42
   Tc(MIN.) =   7.96
   SUBAREA AREA(ACRES) =    0.85      SUBAREA RUNOFF(CFS) =   2.50
   EFFECTIVE AREA(ACRES) =     1.44      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      1.4        PEAK FLOW RATE(CFS) =      4.26

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

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```
   DEPTH(FEET) =   0.49   FLOW VELOCITY(FEET/SEC.) =    5.88
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30412.00 =    464.00 FEET.


************************************************************************
   FLOW PROCESS FROM NODE  30412.00 TO NODE  30413.00 IS CODE =  51
   ------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    534.00  DOWNSTREAM(FEET) =    504.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   204.00   CHANNEL SLOPE = 0.1471
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.435
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -         1.59      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) =       6.49
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.17
   AVERAGE FLOW DEPTH(FEET) =   0.59   TRAVEL TIME(MIN.) =   0.55
   Tc(MIN.) =    8.51
   SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =    4.48
   EFFECTIVE AREA(ACRES) =     3.02     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) =       8.53

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   0.66   FLOW VELOCITY(FEET/SEC.) =    6.55
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30413.00 =    668.00 FEET.


************************************************************************
   FLOW PROCESS FROM NODE  30413.00 TO NODE  30414.00 IS CODE =  51
   ------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    504.00  DOWNSTREAM(FEET) =    472.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE = 0.1296
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.267
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -         3.99      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) =      13.86
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.02
   AVERAGE FLOW DEPTH(FEET) =   0.81   TRAVEL TIME(MIN.) =   0.59
   Tc(MIN.) =    9.10
   SUBAREA AREA(ACRES) =     3.99      SUBAREA RUNOFF(CFS) =   10.66
   EFFECTIVE AREA(ACRES) =     7.01     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        7.0         PEAK FLOW RATE(CFS) =      18.73
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   0.91   FLOW VELOCITY(FEET/SEC.) =    7.62
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30414.00 =    915.00 FEET.

************************************************************************
   FLOW PROCESS FROM NODE  30414.00 TO NODE  30415.00 IS CODE =  51
   ------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    472.00  DOWNSTREAM(FEET) =    447.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   345.00   CHANNEL SLOPE = 0.0725
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.021
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -         6.31      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) =      26.46
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.68
   AVERAGE FLOW DEPTH(FEET) =   1.15   TRAVEL TIME(MIN.) =   0.86
   Tc(MIN.) =    9.96
   SUBAREA AREA(ACRES) =     6.31      SUBAREA RUNOFF(CFS) =   15.45
   EFFECTIVE AREA(ACRES) =    13.32     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       13.3         PEAK FLOW RATE(CFS) =      32.62

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   1.24   FLOW VELOCITY(FEET/SEC.) =    7.06
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30415.00 =   1260.00 FEET.

************************************************************************
   FLOW PROCESS FROM NODE  30415.00 TO NODE  30416.00 IS CODE =  51
   ------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =    403.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   781.00   CHANNEL SLOPE = 0.0563
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.783
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -        11.95      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) =      45.99
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.97
   AVERAGE FLOW DEPTH(FEET) =   1.48   TRAVEL TIME(MIN.) =   1.87
   Tc(MIN.) =   11.83
   SUBAREA AREA(ACRES) =    11.95      SUBAREA RUNOFF(CFS) =   26.71
   EFFECTIVE AREA(ACRES) =    25.27     AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        25.3       PEAK FLOW RATE(CFS) =       56.48

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.60   FLOW VELOCITY(FEET/SEC.) =   7.36
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30416.00 =   2041.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30416.00 TO NODE  30417.00 IS CODE = 51
   -----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    403.00  DOWNSTREAM(FEET) =    387.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   383.00  CHANNEL SLOPE = 0.0418
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.669
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        2.70     0.30      1.000      -
   USER-DEFINED              -        2.80     0.30      1.000      -
   USER-DEFINED              -        2.90     0.30      1.000      -
   USER-DEFINED              -        0.90     0.30      1.000      -
   USER-DEFINED              -        0.10     0.30      1.000      -
   USER-DEFINED              -        3.20     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) =       69.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.91
   AVERAGE FLOW DEPTH(FEET) =  1.84    TRAVEL TIME(MIN.) =   0.92
   Tc(MIN.) =   12.75
   SUBAREA AREA(ACRES) =    12.60      SUBAREA RUNOFF(CFS) =   26.86
   EFFECTIVE AREA(ACRES) =     37.87     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        37.9       PEAK FLOW RATE(CFS) =       80.74

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.94   FLOW VELOCITY(FEET/SEC.) =   7.19
   LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30417.00 =   2424.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30417.00 TO NODE  30417.00 IS CODE = 81
   -----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
   =======================================================================
   MAINLINE Tc(MIN.) =   12.75
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.669
   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              -        0.10     0.30      1.000      -
   USER-DEFINED              -        0.70     0.30      1.000      -
   USER-DEFINED              -        0.20     0.30      1.000      -
   USER-DEFINED              -        0.90     0.30      1.000      -
   USER-DEFINED              -        0.10     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) =    2.60       SUBAREA RUNOFF(CFS) =    5.54
   EFFECTIVE AREA(ACRES) =     40.47   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        40.5       PEAK FLOW RATE(CFS) =       86.28

***************************************************************************
   FLOW PROCESS FROM NODE  30417.00 TO NODE  30417.00 IS CODE = 81
   -----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
   =======================================================================
   MAINLINE Tc(MIN.) =   12.75
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.669
   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              -        0.30     0.30      1.000      -
   USER-DEFINED              -        0.10     0.30      1.000      -
   USER-DEFINED              -        0.10     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) =    1.50       SUBAREA RUNOFF(CFS) =    3.20
   EFFECTIVE AREA(ACRES) =     41.97   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        42.0       PEAK FLOW RATE(CFS) =       89.48
   =======================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)       =       42.0   TC(MIN.) =     12.75
   EFFECTIVE AREA(ACRES) =      41.97  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)     =       89.48
   =======================================================================
   =======================================================================
   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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                      Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 5A EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 50-YR EV MARCH 2019 CCHIU                                          *
 **********************************************************************

  FILE NAME: X35A50EV.DAT
  TIME/DATE OF STUDY: 07:36 03/25/2019
================================================================================
  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;  0.170
  *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  60.0    30.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = 0.00 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  30500.00 TO NODE  30501.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   303.00
  ELEVATION DATA: UPSTREAM(FEET) =    769.00  DOWNSTREAM(FEET) =    695.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.201
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.239
  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"               -        1.01      0.30     1.000    0    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       2.66
  TOTAL AREA(ACRES) =        1.01   PEAK FLOW RATE(CFS) =       2.66


********************************************************************************
  FLOW PROCESS FROM NODE  30501.00 TO NODE  30502.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    695.00  DOWNSTREAM(FEET) =    665.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   167.00    CHANNEL SLOPE = 0.1796
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.100
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp       Ap    SCS
      LAND USE             GROUP     (ACRES)  (INCH/HR) (DECIMAL) CN
  USER-DEFINED               -        0.89      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) =       3.78
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.75
  AVERAGE FLOW DEPTH(FEET) =   0.47    TRAVEL TIME(MIN.) =   0.48
  Tc(MIN.) =    9.68
  SUBAREA AREA(ACRES) =       0.89       SUBAREA RUNOFF(CFS) =    2.24
  EFFECTIVE AREA(ACRES) =       1.89       AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =    0.30   AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =      4.77

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =   0.51    FLOW VELOCITY(FEET/SEC.) =   6.16
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30502.00 =      470.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30502.00 TO NODE  30503.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    665.00  DOWNSTREAM(FEET) =    645.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE = 0.1818
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.019
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         0.98      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) =       5.97
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.49
   AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   0.28
   Tc(MIN.) =    9.97
   SUBAREA AREA(ACRES) =      0.98     SUBAREA RUNOFF(CFS) =     2.40
   EFFECTIVE AREA(ACRES) =     2.88     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       2.9        PEAK FLOW RATE(CFS) =        7.04

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   0.59    FLOW VELOCITY(FEET/SEC.) =   6.73
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30503.00 =      580.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30503.00 TO NODE  30504.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    630.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   152.00   CHANNEL SLOPE = 0.0987
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.962
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         3.30      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) =      10.99
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.01
   AVERAGE FLOW DEPTH(FEET) =   0.78   TRAVEL TIME(MIN.) =   0.42
   Tc(MIN.) =   10.39
   SUBAREA AREA(ACRES) =      3.30     SUBAREA RUNOFF(CFS) =     7.91
   EFFECTIVE AREA(ACRES) =     6.18     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       6.2        PEAK FLOW RATE(CFS) =       14.80
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   0.87    FLOW VELOCITY(FEET/SEC.) =   6.48
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30504.00 =      732.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30504.00 TO NODE  30505.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    600.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   329.00   CHANNEL SLOPE = 0.0912
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.865
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         7.11      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) =      23.00
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.06
   AVERAGE FLOW DEPTH(FEET) =   1.04   TRAVEL TIME(MIN.) =   0.78
   Tc(MIN.) =   11.17
   SUBAREA AREA(ACRES) =      7.11     SUBAREA RUNOFF(CFS) =    16.41
   EFFECTIVE AREA(ACRES) =    13.28     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      13.3        PEAK FLOW RATE(CFS) =       30.67

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   1.16    FLOW VELOCITY(FEET/SEC.) =   7.54
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30505.00 =     1061.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30505.00 TO NODE  30506.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    585.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   297.00   CHANNEL SLOPE = 0.0505
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.772
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
         LAND USE          GROUP     (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        10.71      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) =      42.59
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.57
   AVERAGE FLOW DEPTH(FEET) =   1.47   TRAVEL TIME(MIN.) =   0.75
   Tc(MIN.) =   11.92
   SUBAREA AREA(ACRES) =     10.71     SUBAREA RUNOFF(CFS) =    23.83
   EFFECTIVE AREA(ACRES) =    24.00     AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        24.0         PEAK FLOW RATE(CFS) =        53.38

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.60   FLOW VELOCITY(FEET/SEC.) =   6.96
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30506.00 =    1358.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30506.00 TO NODE  30507.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     585.00  DOWNSTREAM(FEET) =     550.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =     700.00   CHANNEL SLOPE = 0.0500
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.575
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE              GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED                 -       15.01      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) =      68.76
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.36
   AVERAGE FLOW DEPTH(FEET) =   1.77   TRAVEL TIME(MIN.) =   1.59
   Tc(MIN.) =   13.51
   SUBAREA AREA(ACRES) =       15.01        SUBAREA RUNOFF(CFS) =   30.74
   EFFECTIVE AREA(ACRES) =        39.01        AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        39.0         PEAK FLOW RATE(CFS) =        79.88

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.86   FLOW VELOCITY(FEET/SEC.) =   7.66
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30507.00 =    2058.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30507.00 TO NODE  30508.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     550.00  DOWNSTREAM(FEET) =     500.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    1107.00   CHANNEL SLOPE = 0.0452
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 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
   USER-DEFINED                 -       34.74      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) =     111.65
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.02
   AVERAGE FLOW DEPTH(FEET) =   2.15   TRAVEL TIME(MIN.) =   2.30
   Tc(MIN.) =   15.81
```

```
   SUBAREA AREA(ACRES) =       34.74        SUBAREA RUNOFF(CFS) =   63.53
   EFFECTIVE AREA(ACRES) =        73.74        AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        73.7         PEAK FLOW RATE(CFS) =       134.86

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.31   FLOW VELOCITY(FEET/SEC.) =   8.39
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30508.00 =    3165.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30508.00 TO NODE  30518.00 IS CODE =  51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     500.00  DOWNSTREAM(FEET) =     465.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =     982.00   CHANNEL SLOPE = 0.0356
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.181
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE              GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED                 -       11.69      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) =     144.76
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.82
   AVERAGE FLOW DEPTH(FEET) =   2.48   TRAVEL TIME(MIN.) =   2.09
   Tc(MIN.) =   17.90
   SUBAREA AREA(ACRES) =       11.69        SUBAREA RUNOFF(CFS) =   19.79
   EFFECTIVE AREA(ACRES) =        85.43        AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        85.4         PEAK FLOW RATE(CFS) =       144.65

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.48   FLOW VELOCITY(FEET/SEC.) =   7.82
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30518.00 =    4147.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30518.00 TO NODE  30518.00 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.) =   17.90
   RAINFALL INTENSITY(INCH/HR) =   2.18
   AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30
   AREA-AVERAGED Ap =   1.00
   EFFECTIVE STREAM AREA(ACRES) =        85.43
   TOTAL STREAM AREA(ACRES) =        85.43
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     144.65

****************************************************************************
   FLOW PROCESS FROM NODE  30510.00 TO NODE  30511.00 IS CODE =  21
--------------------------------------------------------------------------
```

```
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   315.00
 ELEVATION DATA: UPSTREAM(FEET) =    792.00  DOWNSTREAM(FEET) =    690.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.832
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.344
 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
 "CHAPARRAL,NARROWLEAF"     -       1.17     0.30     1.000    0    8.83
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) =      3.22
 TOTAL AREA(ACRES) =      1.17   PEAK FLOW RATE(CFS) =      3.22

***************************************************************************
 FLOW PROCESS FROM NODE  30511.00 TO NODE  30512.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     690.00  DOWNSTREAM(FEET) =     650.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   182.00   CHANNEL SLOPE = 0.2198
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.221
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
 USER-DEFINED              -       2.22     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) =      6.14
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.04
 AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   0.43
 Tc(MIN.) =   9.26
 SUBAREA AREA(ACRES) =    2.22      SUBAREA RUNOFF(CFS) =    5.84
 EFFECTIVE AREA(ACRES) =     3.39     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       3.4      PEAK FLOW RATE(CFS) =      8.92

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.62   FLOW VELOCITY(FEET/SEC.) =   7.72
 LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30512.00 =    497.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  30512.00 TO NODE  30513.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     650.00  DOWNSTREAM(FEET) =     610.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   352.00   CHANNEL SLOPE = 0.1136
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
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```
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.987
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
 USER-DEFINED              -       2.07     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) =      11.43
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.37
 AVERAGE FLOW DEPTH(FEET) =   0.77   TRAVEL TIME(MIN.) =   0.92
 Tc(MIN.) =   10.18
 SUBAREA AREA(ACRES) =    2.07      SUBAREA RUNOFF(CFS) =    5.00
 EFFECTIVE AREA(ACRES) =     5.46     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       5.5      PEAK FLOW RATE(CFS) =      13.21

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.81   FLOW VELOCITY(FEET/SEC.) =   6.66
 LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30513.00 =    849.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  30513.00 TO NODE  30514.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     610.00  DOWNSTREAM(FEET) =     605.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    49.00   CHANNEL SLOPE = 0.1020
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.973
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
 USER-DEFINED              -       6.01     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) =      20.44
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.10
 AVERAGE FLOW DEPTH(FEET) =   0.98   TRAVEL TIME(MIN.) =   0.11
 Tc(MIN.) =   10.30
 SUBAREA AREA(ACRES) =    6.01      SUBAREA RUNOFF(CFS) =    14.46
 EFFECTIVE AREA(ACRES) =     11.47     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       11.5      PEAK FLOW RATE(CFS) =      27.60

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.10   FLOW VELOCITY(FEET/SEC.) =   7.66
 LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30514.00 =    898.00 FEET.

***************************************************************************
 FLOW PROCESS FROM NODE  30514.00 TO NODE  30515.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     605.00  DOWNSTREAM(FEET) =     600.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =    29.00   CHANNEL SLOPE =   0.1724
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.967
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap       SCS
        LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)    CN
   USER-DEFINED             -         4.23      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) =     32.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.74
  AVERAGE FLOW DEPTH(FEET) =  1.06   TRAVEL TIME(MIN.) =   0.05
  Tc(MIN.) =   10.35
  SUBAREA AREA(ACRES) =    4.23      SUBAREA RUNOFF(CFS) =   10.16
  EFFECTIVE AREA(ACRES) =   15.71    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        15.7        PEAK FLOW RATE(CFS) =      37.70

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.12   FLOW VELOCITY(FEET/SEC.) =  10.08
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30515.00 =    927.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30515.00 TO NODE  30516.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    574.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   444.00   CHANNEL SLOPE =   0.0586
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 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
   USER-DEFINED             -         6.53      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) =     45.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.04
  AVERAGE FLOW DEPTH(FEET) =  1.46   TRAVEL TIME(MIN.) =   1.05
  Tc(MIN.) =   11.40
  SUBAREA AREA(ACRES) =    6.53      SUBAREA RUNOFF(CFS) =   14.90
  EFFECTIVE AREA(ACRES) =   22.23    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        22.2        PEAK FLOW RATE(CFS) =      50.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.53   FLOW VELOCITY(FEET/SEC.) =  7.24
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30516.00 =   1371.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30516.00 TO NODE  30517.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =    519.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1042.00    CHANNEL SLOPE =   0.0528
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.543
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap       SCS
        LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)    CN
   USER-DEFINED             -        12.01      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) =     62.89
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.35
  AVERAGE FLOW DEPTH(FEET) =  1.69   TRAVEL TIME(MIN.) =   2.36
  Tc(MIN.) =   13.76
  SUBAREA AREA(ACRES) =   12.01      SUBAREA RUNOFF(CFS) =   24.25
  EFFECTIVE AREA(ACRES) =   34.24    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        34.2        PEAK FLOW RATE(CFS) =      69.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.75   FLOW VELOCITY(FEET/SEC.) =  7.53
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30517.00 =   2413.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30517.00 TO NODE  30518.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    519.00  DOWNSTREAM(FEET) =    465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1223.00    CHANNEL SLOPE =   0.0442
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.284
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap       SCS
        LAND USE          GROUP     (ACRES)   (INCH/HR)  (DECIMAL)    CN
   USER-DEFINED             -        22.15      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) =     88.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.51
  AVERAGE FLOW DEPTH(FEET) =  1.99   TRAVEL TIME(MIN.) =   2.71
  Tc(MIN.) =   16.48
  SUBAREA AREA(ACRES) =   22.15      SUBAREA RUNOFF(CFS) =   39.54
  EFFECTIVE AREA(ACRES) =   56.39    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        56.4        PEAK FLOW RATE(CFS) =     100.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.08   FLOW VELOCITY(FEET/SEC.) =  7.76
  LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30518.00 =   3636.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30518.00 TO NODE  30518.00 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.) =   16.48
   RAINFALL INTENSITY(INCH/HR) =    2.28
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =      56.39
   TOTAL STREAM AREA(ACRES) =      56.39
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     100.68

   ** CONFLUENCE DATA **
   STREAM     Q      Tc    Intensity  Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
     1      144.65  17.90   2.181   0.30( 0.30) 1.00     85.4   30500.00
     2      100.68  16.48   2.284   0.30( 0.30) 1.00     56.4   30510.00

   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      241.08  16.48   2.284   0.30( 0.30) 1.00    135.0   30510.00
     2      240.13  17.90   2.181   0.30( 0.30) 1.00    141.8   30500.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     241.08    Tc(MIN.) =     16.48
   EFFECTIVE AREA(ACRES) =    135.03   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      141.8
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30518.00 =    4147.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  30518.00 TO NODE  30519.00 IS CODE = 51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =    448.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   451.00   CHANNEL SLOPE = 0.0377
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.224
   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             -         0.50      0.30      1.000      -
   USER-DEFINED             -         2.40      0.30      0.000      -
   USER-DEFINED             -         2.70      0.30      1.000      -
   USER-DEFINED             -         0.10      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 =  0.671
```

```
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     247.73
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.12
   AVERAGE FLOW DEPTH(FEET) =  3.01    TRAVEL TIME(MIN.) =  0.82
   Tc(MIN.) =   17.30
   SUBAREA AREA(ACRES) =      7.30     SUBAREA RUNOFF(CFS) =   13.29
   EFFECTIVE AREA(ACRES) =    142.33   AREA-AVERAGED Fm(INCH/HR) =  0.29
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.98
   TOTAL AREA(ACRES) =      149.1        PEAK FLOW RATE(CFS) =     247.16

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.00   FLOW VELOCITY(FEET/SEC.) =  9.14
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30519.00 =    4598.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  30519.00 TO NODE  30519.00 IS CODE = 81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   17.30
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.224
   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             -         0.10      0.30      1.000      -
   USER-DEFINED             -         2.80      0.30      1.000      -
   USER-DEFINED             -         0.20      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) =      3.80     SUBAREA RUNOFF(CFS) =    6.58
   EFFECTIVE AREA(ACRES) =    146.13   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.98
   TOTAL AREA(ACRES) =      152.9        PEAK FLOW RATE(CFS) =     253.75
================================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =      152.9  TC(MIN.) =      17.30
   EFFECTIVE AREA(ACRES) =    146.13   AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.984
   PEAK FLOW RATE(CFS)   =      253.75

   ** PEAK FLOW RATE TABLE **
   STREAM     Q      Tc    Intensity  Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
     1      253.75  17.30   2.224   0.30( 0.30) 0.98    146.1   30510.00
     2      251.41  18.72   2.122   0.30( 0.30) 0.98    152.9   30500.00
================================================================================
================================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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          Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                    Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


  ************************ DESCRIPTION OF STUDY ************************
  * RMV PA-3 WATERSHED 5B EXISTING CONDITION                          *
  * RATIONAL METHOD HYDROLOGY MODEL LOCAL                             *
  * 50-YR EV MARCH 2019 CCHIU                                         *
  *******************************************************************

  FILE NAME: X35B50EV.DAT
  TIME/DATE OF STUDY: 07:39 03/25/2019
========================================================================
  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; 0.170
  *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  60.0    30.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
   2  50.0    25.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
   3  40.0    20.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
   4  30.0    15.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
   5  20.0    10.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
```

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  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  30530.00 TO NODE  30531.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   318.00
  ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =    605.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.088
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.271
  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
  "CHAPARRAL,BROADLEAF"     -       0.05     0.30    1.000     0   9.09
  NATURAL FAIR COVER
  "OPEN BRUSH"             -        0.48     0.30    1.000     0   9.09
  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) =       0.53   PEAK FLOW RATE(CFS) =     1.42


********************************************************************
  FLOW PROCESS FROM NODE  30531.00 TO NODE  30532.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   605.00  DOWNSTREAM(FEET) =    575.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   123.00   CHANNEL SLOPE = 0.2439
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.172
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL  AREA     Fp       Ap     SCS
      LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED             -       0.25     0.30    1.000     -
  USER-DEFINED             -       0.62     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) =       2.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.91
  AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   0.35
  Tc(MIN.) =    9.43
  SUBAREA AREA(ACRES) =     0.87       SUBAREA RUNOFF(CFS) =    2.25
  EFFECTIVE AREA(ACRES) =      1.40    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
```

```
   TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =        3.62


   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.43   FLOW VELOCITY(FEET/SEC.) =   6.46
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30532.00 =    441.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30532.00 TO NODE  30533.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    575.00  DOWNSTREAM(FEET) =    565.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =     67.00   CHANNEL SLOPE = 0.1493
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.116
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -       0.45      0.30     1.000      -
   USER-DEFINED               -       0.47      0.30     1.000      -
   USER-DEFINED               -       0.01      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) =      4.80
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.71
   AVERAGE FLOW DEPTH(FEET) =   0.53   TRAVEL TIME(MIN.) =   0.20
   Tc(MIN.) =   9.63
   SUBAREA AREA(ACRES) =     0.93       SUBAREA RUNOFF(CFS) =    2.36
   EFFECTIVE AREA(ACRES) =      2.33     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       2.3        PEAK FLOW RATE(CFS) =       5.90

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.57   FLOW VELOCITY(FEET/SEC.) =   6.07
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30533.00 =    508.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30533.00 TO NODE  30534.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =    540.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    172.00   CHANNEL SLOPE = 0.1453
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 15 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
   USER-DEFINED               -       0.01      0.30     1.000      -
   USER-DEFINED               -       0.65      0.30     1.000      -
   USER-DEFINED               -       0.52      0.30     1.000      -
   USER-DEFINED               -       0.36      0.30     1.000      -
   USER-DEFINED               -       0.01      0.30     1.000      -
   USER-DEFINED               -       0.34      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) =      8.20
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.44
   AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   0.44
   Tc(MIN.) =   10.08
   SUBAREA AREA(ACRES) =     1.89       SUBAREA RUNOFF(CFS) =    4.59
   EFFECTIVE AREA(ACRES) =      4.22     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) =       10.26

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.71   FLOW VELOCITY(FEET/SEC.) =   6.85
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30534.00 =    680.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30534.00 TO NODE  30535.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    510.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    302.00   CHANNEL SLOPE = 0.0993
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.902
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -       0.58      0.30     1.000      -
   USER-DEFINED               -       0.16      0.30     1.000      -
   USER-DEFINED               -       0.03      0.30     1.000      -
   USER-DEFINED               -       1.37      0.30     1.000      -
   USER-DEFINED               -       0.22      0.30     1.000      -
   USER-DEFINED               -       0.41      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) =     13.50
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.35
   AVERAGE FLOW DEPTH(FEET) =   0.84   TRAVEL TIME(MIN.) =   0.79
   Tc(MIN.) =   10.87
   SUBAREA AREA(ACRES) =     2.77       SUBAREA RUNOFF(CFS) =    6.49
   EFFECTIVE AREA(ACRES) =      6.99     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       7.0        PEAK FLOW RATE(CFS) =       16.37

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.91   FLOW VELOCITY(FEET/SEC.) =   6.66
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30535.00 =    982.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30535.00 TO NODE  30535.00 IS CODE = 81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   10.87
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.902
   SUBAREA LOSS RATE DATA(AMC II):
```

```
      DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED             -        0.36     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) =     0.36      SUBAREA RUNOFF(CFS) =    0.84
      EFFECTIVE AREA(ACRES) =       7.35   AREA-AVERAGED Fm(INCH/HR) = 0.30
      AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
      TOTAL AREA(ACRES) =       7.3       PEAK FLOW RATE(CFS) =     17.21

   ****************************************************************************
      FLOW PROCESS FROM NODE  30535.00 TO NODE  30536.00 IS CODE = 51
   ----------------------------------------------------------------------------
      >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
      >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ============================================================================
      ELEVATION DATA: UPSTREAM(FEET) =    510.00  DOWNSTREAM(FEET) =    490.00
      CHANNEL LENGTH THRU SUBAREA(FEET) =   356.00   CHANNEL SLOPE = 0.0562
      CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =    3.000
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
      *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.778
      SUBAREA LOSS RATE DATA(AMC II):
       DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED             -        0.85     0.30     1.000     -
      USER-DEFINED             -        0.32     0.30     1.000     -
      USER-DEFINED             -        0.09     0.30     1.000     -
      USER-DEFINED             -        2.69     0.30     1.000     -
      USER-DEFINED             -        0.84     0.30     1.000     -
      USER-DEFINED             -        1.63     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) =     24.38
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.93
      AVERAGE FLOW DEPTH(FEET) =  1.17    TRAVEL TIME(MIN.) =    1.00
      Tc(MIN.) =   11.87
      SUBAREA AREA(ACRES) =     6.42       SUBAREA RUNOFF(CFS) =   14.32
      EFFECTIVE AREA(ACRES) =      13.77      AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
      TOTAL AREA(ACRES) =       13.8        PEAK FLOW RATE(CFS) =      30.72

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) = 1.28   FLOW VELOCITY(FEET/SEC.) =   6.28
      LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30536.00 =    1338.00 FEET.

   ****************************************************************************
      FLOW PROCESS FROM NODE  30536.00 TO NODE  30536.00 IS CODE = 81
   ----------------------------------------------------------------------------
      >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
   ============================================================================
      MAINLINE Tc(MIN.) =  11.87
      *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.778
      SUBAREA LOSS RATE DATA(AMC II):
       DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED             -        0.45     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) =    0.45      SUBAREA RUNOFF(CFS) =    1.00
      EFFECTIVE AREA(ACRES) =      14.22   AREA-AVERAGED Fm(INCH/HR) = 0.30
      AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
      TOTAL AREA(ACRES) =      14.2       PEAK FLOW RATE(CFS) =     31.72

   ****************************************************************************
      FLOW PROCESS FROM NODE  30536.00 TO NODE  30537.00 IS CODE = 51
   ----------------------------------------------------------------------------
      >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
      >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ============================================================================
      ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    455.00
      CHANNEL LENGTH THRU SUBAREA(FEET) =   556.00   CHANNEL SLOPE = 0.0629
      CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =    3.000
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
      *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.613
      SUBAREA LOSS RATE DATA(AMC II):
       DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED             -        0.49     0.30     1.000     -
      USER-DEFINED             -        2.10     0.30     1.000     -
      USER-DEFINED             -        0.33     0.30     1.000     -
      USER-DEFINED             -        0.39     0.30     1.000     -
      USER-DEFINED             -        3.76     0.30     1.000     -
      USER-DEFINED             -        0.02     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) =     39.11
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.96
      AVERAGE FLOW DEPTH(FEET) =  1.37    TRAVEL TIME(MIN.) =    1.33
      Tc(MIN.) =   13.20
      SUBAREA AREA(ACRES) =     7.09       SUBAREA RUNOFF(CFS) =   14.76
      EFFECTIVE AREA(ACRES) =      21.31      AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
      TOTAL AREA(ACRES) =       21.3        PEAK FLOW RATE(CFS) =      44.37

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) = 1.43   FLOW VELOCITY(FEET/SEC.) =   7.22
      LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30537.00 =    1894.00 FEET.

   ****************************************************************************
      FLOW PROCESS FROM NODE  30537.00 TO NODE  30537.00 IS CODE = 81
   ----------------------------------------------------------------------------
      >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
   ============================================================================
      MAINLINE Tc(MIN.) =  13.20
      *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.613
      SUBAREA LOSS RATE DATA(AMC II):
       DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED             -        0.49     0.30     1.000     -
      USER-DEFINED             -        3.83     0.30     1.000     -
      USER-DEFINED             -        0.39     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) =     4.71       SUBAREA RUNOFF(CFS) =   9.81
      EFFECTIVE AREA(ACRES) =      26.02   AREA-AVERAGED Fm(INCH/HR) = 0.30
      AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
```

```
   TOTAL AREA(ACRES) =        26.0       PEAK FLOW RATE(CFS) =       54.17


*****************************************************************************
  FLOW PROCESS FROM NODE  30537.00 TO NODE  30538.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    417.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   569.00   CHANNEL SLOPE =  0.0668
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.479
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        35.49      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) =     88.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.75
  AVERAGE FLOW DEPTH(FEET) =   1.84   TRAVEL TIME(MIN.) =   1.08
  Tc(MIN.) =   14.28
  SUBAREA AREA(ACRES) =     35.49       SUBAREA RUNOFF(CFS) =   69.60
  EFFECTIVE AREA(ACRES) =      61.51     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        61.5        PEAK FLOW RATE(CFS) =     120.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.06   FLOW VELOCITY(FEET/SEC.) =   9.45
  LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30538.00 =    2463.00 FEET.
===========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       61.5  TC(MIN.) =      14.28
  EFFECTIVE AREA(ACRES) =      61.51  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =     120.62
===========================================================================
===========================================================================
  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 ***************************
 * RMV PA-3 WATERSHED 5C EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 50-YR EV MARCH 2019 CCHIU                                              *
 *************************************************************************

  FILE NAME: X35C50EV.DAT
  TIME/DATE OF STUDY: 07:40 03/25/2019
========================================================================
   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;  0.170
  *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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30550.00 TO NODE  30551.00 IS CODE =  21
 ------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =    865.00  DOWNSTREAM(FEET) =    700.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.249
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.511
  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
  "CHAPARRAL,BROADLEAF"      -        1.55     0.30     1.000     0   8.25
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       4.47
  TOTAL AREA(ACRES) =       1.55   PEAK FLOW RATE(CFS) =       4.47

 ************************************************************************
  FLOW PROCESS FROM NODE  30551.00 TO NODE  30552.00 IS CODE =  51
 ------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    700.00  DOWNSTREAM(FEET) =    685.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   304.00   CHANNEL SLOPE = 0.0493
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.150
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap     SCS
      LAND USE             GROUP     (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        1.49     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) =        6.38
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.02
  AVERAGE FLOW DEPTH(FEET) =   0.73   TRAVEL TIME(MIN.) =   1.26
  Tc(MIN.) =    9.51
  SUBAREA AREA(ACRES) =    1.49       SUBAREA RUNOFF(CFS) =    3.81
  EFFECTIVE AREA(ACRES) =       3.03     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) =       7.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.78   FLOW VELOCITY(FEET/SEC.) =   4.25
    LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30552.00 =    634.00 FEET.


*********************************************************************
   FLOW PROCESS FROM NODE  30552.00 TO NODE  30553.00 IS CODE = 51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    685.00  DOWNSTREAM(FEET) =    650.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   84.00   CHANNEL SLOPE = 0.4167
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 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              -        3.11     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) =     11.72
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.59
   AVERAGE FLOW DEPTH(FEET) =   0.61   TRAVEL TIME(MIN.) =   0.13
   Tc(MIN.) =    9.64
   SUBAREA AREA(ACRES) =     3.11      SUBAREA RUNOFF(CFS) =     7.88
   EFFECTIVE AREA(ACRES) =     6.15     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) =     15.56

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.68   FLOW VELOCITY(FEET/SEC.) = 11.34
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30553.00 =    718.00 FEET.


*********************************************************************
   FLOW PROCESS FROM NODE  30553.00 TO NODE  30554.00 IS CODE = 51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    620.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  370.00   CHANNEL SLOPE = 0.0811
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.935
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
          LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        3.21     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) =     19.36
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.42
   AVERAGE FLOW DEPTH(FEET) =   1.00   TRAVEL TIME(MIN.) =   0.96
   Tc(MIN.) =   10.60
   SUBAREA AREA(ACRES) =     3.21      SUBAREA RUNOFF(CFS) =     7.60
   EFFECTIVE AREA(ACRES) =     9.35     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        9.4        PEAK FLOW RATE(CFS) =     22.18
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.06   FLOW VELOCITY(FEET/SEC.) =   6.63
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30554.00 =   1088.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30554.00 TO NODE  30555.00 IS CODE = 51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =    604.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  151.00   CHANNEL SLOPE = 0.1060
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.898
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
          LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       14.25     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) =     38.84
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.44
   AVERAGE FLOW DEPTH(FEET) =   1.24   TRAVEL TIME(MIN.) =   0.30
   Tc(MIN.) =   10.90
   SUBAREA AREA(ACRES) =    14.25      SUBAREA RUNOFF(CFS) =    33.32
   EFFECTIVE AREA(ACRES) =    23.60     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       23.6        PEAK FLOW RATE(CFS) =     55.19

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.41   FLOW VELOCITY(FEET/SEC.) =   9.27
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30555.00 =   1239.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30555.00 TO NODE  30556.00 IS CODE = 51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    604.00  DOWNSTREAM(FEET) =    543.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1099.00   CHANNEL SLOPE = 0.0555
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.614
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
          LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       23.90     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) =     80.10
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.99
   AVERAGE FLOW DEPTH(FEET) =   1.83   TRAVEL TIME(MIN.) =   2.29
   Tc(MIN.) =   13.19
   SUBAREA AREA(ACRES) =    23.90      SUBAREA RUNOFF(CFS) =    49.78
   EFFECTIVE AREA(ACRES) =    47.50     AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        47.5        PEAK FLOW RATE(CFS) =       98.93

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.98   FLOW VELOCITY(FEET/SEC.) =   8.41
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30556.00 =   2338.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  30556.00 TO NODE  30557.00 IS CODE = 51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    543.00  DOWNSTREAM(FEET) =    503.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1074.00   CHANNEL SLOPE = 0.0372
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.350
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
        LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -       23.19     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) =    120.34
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.59
   AVERAGE FLOW DEPTH(FEET) =  2.30   TRAVEL TIME(MIN.) =   2.36
   Tc(MIN.) =  15.55
   SUBAREA AREA(ACRES) =     23.19        SUBAREA RUNOFF(CFS) =    42.79
   EFFECTIVE AREA(ACRES) =     70.69        AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        70.7        PEAK FLOW RATE(CFS) =      130.44

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.37   FLOW VELOCITY(FEET/SEC.) =   7.75
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30557.00 =   3412.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  30557.00 TO NODE  30558.00 IS CODE = 51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    503.00  DOWNSTREAM(FEET) =    460.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1155.00   CHANNEL SLOPE = 0.0372
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.185
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
        LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -       59.03     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) =    180.56
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.41
   AVERAGE FLOW DEPTH(FEET) =  2.68   TRAVEL TIME(MIN.) =   2.29
   Tc(MIN.) =  17.84
```

```
   SUBAREA AREA(ACRES) =     59.03        SUBAREA RUNOFF(CFS) =   100.18
   EFFECTIVE AREA(ACRES) =    129.73        AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       129.7        PEAK FLOW RATE(CFS) =      220.13

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.88   FLOW VELOCITY(FEET/SEC.) =   8.84
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30558.00 =   4567.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30558.00 TO NODE  30559.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    399.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1322.00   CHANNEL SLOPE = 0.0461
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 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
   USER-DEFINED               -       45.38     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) =    255.41
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.94
   AVERAGE FLOW DEPTH(FEET) =  2.93   TRAVEL TIME(MIN.) =   2.22
   Tc(MIN.) =  20.06
   SUBAREA AREA(ACRES) =     45.38        SUBAREA RUNOFF(CFS) =    70.55
   EFFECTIVE AREA(ACRES) =    175.11        AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       175.1        PEAK FLOW RATE(CFS) =      272.21

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.00   FLOW VELOCITY(FEET/SEC.) =  10.07
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30559.00 =   5889.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30559.00 TO NODE  30560.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    399.00  DOWNSTREAM(FEET) =    375.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  373.00   CHANNEL SLOPE = 0.0643
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 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               -       12.10     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) =    281.48
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.55
```

```
   AVERAGE FLOW DEPTH(FEET) =   2.85   TRAVEL TIME(MIN.) =   0.54
   Tc(MIN.) =   20.60
   SUBAREA AREA(ACRES) =    12.10      SUBAREA RUNOFF(CFS) =    18.53
   EFFECTIVE AREA(ACRES) =    187.21      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      187.2        PEAK FLOW RATE(CFS) =     286.67

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.87   FLOW VELOCITY(FEET/SEC.) =  11.59
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30560.00 =    6262.00 FEET.
================================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =       187.2  TC(MIN.) =     20.60
   EFFECTIVE AREA(ACRES) =    187.21  AREA-AVERAGED Fm(INCH/HR)=   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)   =       286.67
================================================================================
================================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
********************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                         Analysis prepared by:

                      Michael Baker International
                     5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 5D EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 50-YR EV MARCH 2019 CCHIU                                            *
 ************************************************************************

  FILE NAME: X35D50EV.DAT
  TIME/DATE OF STUDY: 07:43 03/25/2019
================================================================================
   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;  0.170
  *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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30520.00 TO NODE  30521.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   315.00
  ELEVATION DATA: UPSTREAM(FEET) =    866.00  DOWNSTREAM(FEET) =    692.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.937
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.600
  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
  "CHAPARRAL,BROADLEAF"      -         1.83     0.30     1.000     0    7.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       5.43
  TOTAL AREA(ACRES) =       1.83   PEAK FLOW RATE(CFS) =       5.43

********************************************************************************
  FLOW PROCESS FROM NODE  30521.00 TO NODE  30522.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    692.00  DOWNSTREAM(FEET) =    670.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   148.00    CHANNEL SLOPE = 0.1486
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.486
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap     SCS
      LAND USE             GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -         0.75     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) =       6.50
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.18
  AVERAGE FLOW DEPTH(FEET) =   0.59    TRAVEL TIME(MIN.) =   0.40
  Tc(MIN.) =    8.34
  SUBAREA AREA(ACRES) =     0.75        SUBAREA RUNOFF(CFS) =    2.14
  EFFECTIVE AREA(ACRES) =      2.57       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) =       7.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.62    FLOW VELOCITY(FEET/SEC.) =    6.34
   LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30522.00 =     463.00 FEET.


*********************************************************************
   FLOW PROCESS FROM NODE  30522.00 TO NODE  30523.00 IS CODE = 51
   ---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     670.00  DOWNSTREAM(FEET) =     654.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  104.00   CHANNEL SLOPE = 0.1538
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.413
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED                -         1.72     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) =       9.78
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.86
   AVERAGE FLOW DEPTH(FEET) =   0.69    TRAVEL TIME(MIN.) =   0.25
   Tc(MIN.) =    8.59
   SUBAREA AREA(ACRES) =     1.72      SUBAREA RUNOFF(CFS) =    4.81
   EFFECTIVE AREA(ACRES) =     4.29     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        4.3        PEAK FLOW RATE(CFS) =      12.02

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.74    FLOW VELOCITY(FEET/SEC.) =   7.26
   LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30523.00 =     567.00 FEET.


*********************************************************************
   FLOW PROCESS FROM NODE  30523.00 TO NODE  30524.00 IS CODE = 51
   ---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     654.00  DOWNSTREAM(FEET) =     615.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  378.00   CHANNEL SLOPE = 0.1032
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 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                -         3.19     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) =      16.11
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.70
   AVERAGE FLOW DEPTH(FEET) =   0.90    TRAVEL TIME(MIN.) =   0.94
   Tc(MIN.) =    9.53
   SUBAREA AREA(ACRES) =     3.19      SUBAREA RUNOFF(CFS) =    8.17
   EFFECTIVE AREA(ACRES) =     7.48     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        7.5        PEAK FLOW RATE(CFS) =      19.15
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.95    FLOW VELOCITY(FEET/SEC.) =   7.06
   LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30524.00 =     945.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30524.00 TO NODE  30525.00 IS CODE = 51
   ---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     615.00  DOWNSTREAM(FEET) =     593.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  190.00   CHANNEL SLOPE = 0.1158
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.032
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED                -         6.94     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) =      27.69
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.05
   AVERAGE FLOW DEPTH(FEET) =   1.07    TRAVEL TIME(MIN.) =   0.39
   Tc(MIN.) =    9.92
   SUBAREA AREA(ACRES) =     6.94      SUBAREA RUNOFF(CFS) =   17.07
   EFFECTIVE AREA(ACRES) =    14.42     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       14.4        PEAK FLOW RATE(CFS) =      35.46

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.18    FLOW VELOCITY(FEET/SEC.) =   8.52
   LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30525.00 =    1135.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30525.00 TO NODE  30526.00 IS CODE = 51
   ---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     593.00  DOWNSTREAM(FEET) =     545.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  642.00   CHANNEL SLOPE = 0.0748
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.849
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED                -         9.38     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) =      46.22
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.77
   AVERAGE FLOW DEPTH(FEET) =   1.41    TRAVEL TIME(MIN.) =   1.38
   Tc(MIN.) =   11.30
   SUBAREA AREA(ACRES) =     9.38      SUBAREA RUNOFF(CFS) =   21.51
   EFFECTIVE AREA(ACRES) =    23.80     AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =      54.59

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.50   FLOW VELOCITY(FEET/SEC.) =  8.09
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30526.00 =   1777.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30526.00 TO NODE  30527.00 IS CODE =  51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =     483.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1032.00   CHANNEL SLOPE = 0.0601
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.586
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        21.43     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) =     76.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.11
  AVERAGE FLOW DEPTH(FEET) =  1.77   TRAVEL TIME(MIN.) =   2.12
  Tc(MIN.) =  13.42
  SUBAREA AREA(ACRES) =    21.43       SUBAREA RUNOFF(CFS) =   44.08
  EFFECTIVE AREA(ACRES) =     45.23      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       45.2       PEAK FLOW RATE(CFS) =      93.04

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.91   FLOW VELOCITY(FEET/SEC.) =  8.50
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30527.00 =   2809.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30527.00 TO NODE  30528.00 IS CODE =  51
-----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    483.00  DOWNSTREAM(FEET) =     456.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  473.00   CHANNEL SLOPE = 0.0571
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.472
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        11.90     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) =    104.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.62
  AVERAGE FLOW DEPTH(FEET) =  2.01   TRAVEL TIME(MIN.) =   0.91
  Tc(MIN.) =  14.34
```

```
  SUBAREA AREA(ACRES) =     11.90       SUBAREA RUNOFF(CFS) =   23.27
  EFFECTIVE AREA(ACRES) =     57.13      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        57.1       PEAK FLOW RATE(CFS) =     111.69

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 2.06   FLOW VELOCITY(FEET/SEC.) =  8.75
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30528.00 =   3282.00 FEET.
=============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =       57.1  TC(MIN.) =     14.34
  EFFECTIVE AREA(ACRES)   =      57.13  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)     =     111.69
=============================================================================

=============================================================================
  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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                        Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 6 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 50-YR EV MARCH 2019 CCHIU                                          *
 **********************************************************************

  FILE NAME: X30650EV.DAT
  TIME/DATE OF STUDY: 08:04 03/25/2019
=====================================================================
   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;  0.170
  *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  60.0     30.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   2  50.0     25.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   3  40.0     20.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   4  30.0     15.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   5  20.0     10.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30600.00 TO NODE  30601.00 IS CODE =  21
---------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   328.00
  ELEVATION DATA: UPSTREAM(FEET) =   552.00  DOWNSTREAM(FEET) =    508.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.706
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.922
  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"              -       0.29     0.30      1.000    0   10.71
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.68
  TOTAL AREA(ACRES) =       0.29   PEAK FLOW RATE(CFS) =       0.68

**********************************************************************
  FLOW PROCESS FROM NODE  30601.00 TO NODE  30602.00 IS CODE =  51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   508.00  DOWNSTREAM(FEET) =    480.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   176.00   CHANNEL SLOPE = 0.1591
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.830
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -       0.29     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) =       1.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.93
  AVERAGE FLOW DEPTH(FEET) =  0.29   TRAVEL TIME(MIN.) =   0.75
  Tc(MIN.) =   11.45
  SUBAREA AREA(ACRES) =     0.29       SUBAREA RUNOFF(CFS) =    0.67
  EFFECTIVE AREA(ACRES) =      0.58      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       0.6         PEAK FLOW RATE(CFS) =       1.32

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.32   FLOW VELOCITY(FEET/SEC.) =   4.21
    LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30602.00 =    504.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  30602.00 TO NODE  30603.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   480.00  DOWNSTREAM(FEET) =    401.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  326.00   CHANNEL SLOPE = 0.2423
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.710
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         0.76      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) =      2.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.64
  AVERAGE FLOW DEPTH(FEET) =  0.36    TRAVEL TIME(MIN.) =   0.96
  Tc(MIN.) =   12.42
  SUBAREA AREA(ACRES) =    0.76      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =    1.34    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) =      2.90

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =   6.05
  LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30603.00 =    830.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  30603.00 TO NODE  30604.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   401.00  DOWNSTREAM(FEET) =    385.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  106.00   CHANNEL SLOPE = 0.1509
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.670
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         0.33      0.30      1.000     -
  USER-DEFINED              -         0.62      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) =      3.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.41
  AVERAGE FLOW DEPTH(FEET) =  0.49    TRAVEL TIME(MIN.) =   0.33
  Tc(MIN.) =   12.74
  SUBAREA AREA(ACRES) =    0.95      SUBAREA RUNOFF(CFS) =    2.03
  EFFECTIVE AREA(ACRES) =    2.29    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
```

```
    TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       4.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.53   FLOW VELOCITY(FEET/SEC.) =   5.76
  LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30604.00 =    936.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE = 81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =  12.74
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.670
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         1.27      0.30      1.000     -
  USER-DEFINED              -         0.26      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) =    1.53      SUBAREA RUNOFF(CFS) =    3.26
  EFFECTIVE AREA(ACRES) =     3.82   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       3.8        PEAK FLOW RATE(CFS) =       8.14

**************************************************************************
  FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE = 81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =  12.74
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.670
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         1.01      0.30      1.000     -
  USER-DEFINED              -         0.29      0.30      1.000     -
  USER-DEFINED              -         0.99      0.30      1.000     -
  USER-DEFINED              -         2.11      0.30      1.000     -
  USER-DEFINED              -         1.41      0.30      1.000     -
  USER-DEFINED              -         0.02      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) =    5.83      SUBAREA RUNOFF(CFS) =   12.44
  EFFECTIVE AREA(ACRES) =     9.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       9.6        PEAK FLOW RATE(CFS) =      20.57

**************************************************************************
  FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE = 81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =  12.74
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.670
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
```

```
  USER-DEFINED              -        0.21     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) =    0.21      SUBAREA RUNOFF(CFS) =    0.45
  EFFECTIVE AREA(ACRES) =      9.86   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =          9.9      PEAK FLOW RATE(CFS) =       21.02
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)    =         9.9  TC(MIN.) =     12.74
  EFFECTIVE AREA(ACRES) =      9.86  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      21.02
===============================================================================
===============================================================================
  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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                      Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 7 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 50-YR EV MARCH 2019 CCHIU                                           *
 *********************************************************************

  FILE NAME: X30750EV.DAT
  TIME/DATE OF STUDY: 08:11 03/25/2019
========================================================================
   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; 0.170
  *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  60.0    30.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30700.00 TO NODE  30701.00 IS CODE =  21
 -----------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =======================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
  ELEVATION DATA: UPSTREAM(FEET) =    760.00  DOWNSTREAM(FEET) =    600.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.225
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.518
  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
  "CHAPARRAL,BROADLEAF"      -        1.30     0.30     1.000     0   8.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       3.78
  TOTAL AREA(ACRES) =       1.30   PEAK FLOW RATE(CFS) =      3.78

 ***********************************************************************
  FLOW PROCESS FROM NODE  30701.00 TO NODE  30702.00 IS CODE =  51
 -----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    545.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   378.00   CHANNEL SLOPE = 0.1455
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.227
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp       Ap    SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -        2.43     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) =       6.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.19
  AVERAGE FLOW DEPTH(FEET) =   0.61    TRAVEL TIME(MIN.) =   1.02
  Tc(MIN.) =    9.24
  SUBAREA AREA(ACRES) =    2.43       SUBAREA RUNOFF(CFS) =    6.40
  EFFECTIVE AREA(ACRES) =      3.74      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       3.7        PEAK FLOW RATE(CFS) =      9.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.70   FLOW VELOCITY(FEET/SEC.) =   6.75
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30702.00 =    703.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30702.00 TO NODE  30703.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =     539.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    71.00   CHANNEL SLOPE =  0.0845
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.169
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        2.09      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) =     12.54
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.87
   AVERAGE FLOW DEPTH(FEET) =  0.84   TRAVEL TIME(MIN.) =   0.20
   Tc(MIN.) =    9.44
   SUBAREA AREA(ACRES) =     2.09      SUBAREA RUNOFF(CFS) =    5.40
   EFFECTIVE AREA(ACRES) =     5.83     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) =       15.04

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.90   FLOW VELOCITY(FEET/SEC.) =   6.15
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30703.00 =    774.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30703.00 TO NODE  30704.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    539.00  DOWNSTREAM(FEET) =     509.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   317.00   CHANNEL SLOPE =  0.0946
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.981
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        2.46      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) =     18.02
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.67
   AVERAGE FLOW DEPTH(FEET) =  0.95   TRAVEL TIME(MIN.) =   0.79
   Tc(MIN.) =   10.24
   SUBAREA AREA(ACRES) =     2.46      SUBAREA RUNOFF(CFS) =    5.94
   EFFECTIVE AREA(ACRES) =     8.29     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        8.3         PEAK FLOW RATE(CFS) =       20.00
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.99   FLOW VELOCITY(FEET/SEC.) =   6.84
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30704.00 =   1091.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30704.00 TO NODE  30705.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    509.00  DOWNSTREAM(FEET) =    484.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   294.00   CHANNEL SLOPE =  0.0850
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.893
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        2.96      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) =     23.46
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.89
   AVERAGE FLOW DEPTH(FEET) =  1.07   TRAVEL TIME(MIN.) =   0.71
   Tc(MIN.) =   10.95
   SUBAREA AREA(ACRES) =     2.96      SUBAREA RUNOFF(CFS) =    6.91
   EFFECTIVE AREA(ACRES) =    11.25     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) =       26.25

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.11   FLOW VELOCITY(FEET/SEC.) =   7.09
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30705.00 =   1385.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30705.00 TO NODE  30706.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    484.00  DOWNSTREAM(FEET) =    464.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   257.00   CHANNEL SLOPE =  0.0778
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.820
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        7.40      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) =     34.65
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.34
   AVERAGE FLOW DEPTH(FEET) =  1.25   TRAVEL TIME(MIN.) =   0.58
   Tc(MIN.) =   11.53
   SUBAREA AREA(ACRES) =     7.40      SUBAREA RUNOFF(CFS) =   16.79
   EFFECTIVE AREA(ACRES) =    18.66     AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      18.7        PEAK FLOW RATE(CFS) =      42.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.35   FLOW VELOCITY(FEET/SEC.) =   7.70
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30706.00 =   1642.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30706.00 TO NODE  30707.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    464.00  DOWNSTREAM(FEET) =     455.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   147.00   CHANNEL SLOPE = 0.0612
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.779
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap       SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        7.29     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) =      50.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.34
  AVERAGE FLOW DEPTH(FEET) =   1.51   TRAVEL TIME(MIN.) =   0.33
  Tc(MIN.) =   11.86
  SUBAREA AREA(ACRES) =      7.29       SUBAREA RUNOFF(CFS) =   16.26
  EFFECTIVE AREA(ACRES) =     25.94      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      25.9        PEAK FLOW RATE(CFS) =      57.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.59   FLOW VELOCITY(FEET/SEC.) =   7.61
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30707.00 =   1789.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30707.00 TO NODE  30708.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =     432.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   461.00   CHANNEL SLOPE = 0.0499
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.647
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap       SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        5.94     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) =      64.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.23
  AVERAGE FLOW DEPTH(FEET) =   1.72   TRAVEL TIME(MIN.) =   1.06
  Tc(MIN.) =   12.93
```

```
  SUBAREA AREA(ACRES) =       5.94       SUBAREA RUNOFF(CFS) =   12.55
  EFFECTIVE AREA(ACRES) =     31.89      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      31.9        PEAK FLOW RATE(CFS) =      67.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.75   FLOW VELOCITY(FEET/SEC.) =   7.33
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30708.00 =   2250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30708.00 TO NODE  30709.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    432.00  DOWNSTREAM(FEET) =     422.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE = 0.0588
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.604
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap       SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       13.07     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) =      80.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.15
  AVERAGE FLOW DEPTH(FEET) =   1.82   TRAVEL TIME(MIN.) =   0.35
  Tc(MIN.) =   13.27
  SUBAREA AREA(ACRES) =      13.07       SUBAREA RUNOFF(CFS) =   27.10
  EFFECTIVE AREA(ACRES) =     44.95      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      45.0        PEAK FLOW RATE(CFS) =      93.22

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.92   FLOW VELOCITY(FEET/SEC.) =   8.45
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30709.00 =   2420.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30709.00 TO NODE  30710.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    422.00  DOWNSTREAM(FEET) =     377.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1074.00   CHANNEL SLOPE = 0.0419
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.348
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap       SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       19.46     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) =     111.17
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.76
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  AVERAGE FLOW DEPTH(FEET) =  2.18   TRAVEL TIME(MIN.) =   2.31
  Tc(MIN.) =   15.58
  SUBAREA AREA(ACRES) =    19.46       SUBAREA RUNOFF(CFS) =    35.87
  EFFECTIVE AREA(ACRES) =     64.41      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        64.4        PEAK FLOW RATE(CFS) =      118.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.24   FLOW VELOCITY(FEET/SEC.) =   7.90
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30710.00 =    3494.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  30710.00 TO NODE  30711.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    377.00  DOWNSTREAM(FEET) =    345.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   546.00   CHANNEL SLOPE =  0.0586
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.290
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap     SCS
      LAND USE              GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        9.60      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) =     127.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.34
  AVERAGE FLOW DEPTH(FEET) =  1.94   TRAVEL TIME(MIN.) =   0.80
  Tc(MIN.) =   16.38
  SUBAREA AREA(ACRES) =     9.60       SUBAREA RUNOFF(CFS) =    17.20
  EFFECTIVE AREA(ACRES) =     74.01      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        74.0        PEAK FLOW RATE(CFS) =      132.59

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.97   FLOW VELOCITY(FEET/SEC.) =  11.44
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30711.00 =    4040.00 FEET.
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       74.0   TC(MIN.) =    16.38
  EFFECTIVE AREA(ACRES) =     74.01  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      132.59
===============================================================================
===============================================================================
  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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                     Analysis prepared by:

                     Michael Baker International
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                       Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 8 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 50-YR EV MARCH 2019 CCHIU                                          *
 **********************************************************************

  FILE NAME: X30850EV.DAT
  TIME/DATE OF STUDY: 08:14 03/25/2019
=============================================================================
   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; 0.170
  *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  60.0     30.0    0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  2  50.0     25.0    0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  3  40.0     20.0    0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  4  30.0     15.0    0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  5  20.0     10.0    0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  30800.00 TO NODE  30801.00 IS CODE =  21
 --------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   324.00
   ELEVATION DATA: UPSTREAM(FEET) =   646.00  DOWNSTREAM(FEET) =    573.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.604
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.123
   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
   "CHAPARRAL,BROADLEAF"     -       0.69     0.30      1.000     0   9.60
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       1.74
   TOTAL AREA(ACRES) =        0.69   PEAK FLOW RATE(CFS) =      1.74


 ****************************************************************************
   FLOW PROCESS FROM NODE  30801.00 TO NODE  30802.00 IS CODE =  51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    573.00  DOWNSTREAM(FEET) =    538.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   104.00    CHANNEL SLOPE = 0.3365
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.051
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp         Ap    SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       1.06     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) =       3.06
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.91
   AVERAGE FLOW DEPTH(FEET) =   0.38    TRAVEL TIME(MIN.) =   0.25
   Tc(MIN.) =    9.86
   SUBAREA AREA(ACRES) =    1.06       SUBAREA RUNOFF(CFS) =   2.63
   EFFECTIVE AREA(ACRES) =      1.75      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =        4.33

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
     DEPTH(FEET) =   0.44   FLOW VELOCITY(FEET/SEC.) =    7.54
     LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30802.00 =     428.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  30802.00 TO NODE  30803.00 IS CODE =  51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    538.00  DOWNSTREAM(FEET) =    500.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   166.00   CHANNEL SLOPE = 0.2289
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.981
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         1.89      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) =       6.62
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.23
   AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   0.38
   Tc(MIN.) =   10.24
   SUBAREA AREA(ACRES) =     1.89      SUBAREA RUNOFF(CFS) =    4.56
   EFFECTIVE AREA(ACRES) =     3.64      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) =       8.79

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   0.61   FLOW VELOCITY(FEET/SEC.) =    7.79
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30803.00 =     594.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  30803.00 TO NODE  30804.00 IS CODE =  51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    447.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   284.00   CHANNEL SLOPE = 0.1866
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 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              -         3.78      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) =      13.23
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.99
   AVERAGE FLOW DEPTH(FEET) =   0.74   TRAVEL TIME(MIN.) =   0.59
   Tc(MIN.) =   10.83
   SUBAREA AREA(ACRES) =     3.78      SUBAREA RUNOFF(CFS) =    8.88
   EFFECTIVE AREA(ACRES) =     7.43      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       7.4         PEAK FLOW RATE(CFS) =      17.42
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   0.82   FLOW VELOCITY(FEET/SEC.) =    8.61
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30804.00 =     878.00 FEET.

**********************************************************************
   FLOW PROCESS FROM NODE  30804.00 TO NODE  30805.00 IS CODE =  51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =    438.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   101.00   CHANNEL SLOPE = 0.0891
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.877
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         4.22      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) =      22.32
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.95
   AVERAGE FLOW DEPTH(FEET) =   1.03   TRAVEL TIME(MIN.) =   0.24
   Tc(MIN.) =   11.07
   SUBAREA AREA(ACRES) =     4.22      SUBAREA RUNOFF(CFS) =    9.80
   EFFECTIVE AREA(ACRES) =    11.65      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      11.7         PEAK FLOW RATE(CFS) =      27.02

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =   1.12   FLOW VELOCITY(FEET/SEC.) =    7.22
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30805.00 =     979.00 FEET.

**********************************************************************
   FLOW PROCESS FROM NODE  30805.00 TO NODE  30806.00 IS CODE =  51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    438.00  DOWNSTREAM(FEET) =    419.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   418.00   CHANNEL SLOPE = 0.0455
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.733
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         7.15      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) =      34.86
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.00
   AVERAGE FLOW DEPTH(FEET) =   1.39   TRAVEL TIME(MIN.) =   1.16
   Tc(MIN.) =   12.23
   SUBAREA AREA(ACRES) =     7.15      SUBAREA RUNOFF(CFS) =   15.67
   EFFECTIVE AREA(ACRES) =    18.80      AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       18.8       PEAK FLOW RATE(CFS) =      41.18

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.48   FLOW VELOCITY(FEET/SEC.) =   6.24
  LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30806.00 =   1397.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30806.00 TO NODE  30807.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    419.00  DOWNSTREAM(FEET) =     395.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    499.00   CHANNEL SLOPE = 0.0481
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.580
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        9.75      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) =     51.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.75
  AVERAGE FLOW DEPTH(FEET) =  1.59   TRAVEL TIME(MIN.) =  1.23
  Tc(MIN.) =   13.47
  SUBAREA AREA(ACRES) =     9.75       SUBAREA RUNOFF(CFS) =   20.01
  EFFECTIVE AREA(ACRES) =     28.56      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       28.6       PEAK FLOW RATE(CFS) =      58.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.67   FLOW VELOCITY(FEET/SEC.) =   6.97
  LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30807.00 =   1896.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30807.00 TO NODE  30808.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    395.00  DOWNSTREAM(FEET) =     358.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    698.00   CHANNEL SLOPE = 0.0530
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.389
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       10.78      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) =     68.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.53
  AVERAGE FLOW DEPTH(FEET) =  1.74   TRAVEL TIME(MIN.) =  1.54
  Tc(MIN.) =   15.01
```
```
  SUBAREA AREA(ACRES) =     10.78       SUBAREA RUNOFF(CFS) =   20.26
  EFFECTIVE AREA(ACRES) =     39.33      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       39.3       PEAK FLOW RATE(CFS) =      73.96

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.79   FLOW VELOCITY(FEET/SEC.) =   7.69
  LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30808.00 =   2594.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30808.00 TO NODE  30809.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =     332.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    102.00   CHANNEL SLOPE = 0.2549
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.382
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       10.00      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) =     83.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 17.66
  AVERAGE FLOW DEPTH(FEET) =  1.25   TRAVEL TIME(MIN.) =  0.10
  Tc(MIN.) =   15.11
  SUBAREA AREA(ACRES) =     10.00       SUBAREA RUNOFF(CFS) =   18.74
  EFFECTIVE AREA(ACRES) =     49.33      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       49.3       PEAK FLOW RATE(CFS) =      92.46

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.30   FLOW VELOCITY(FEET/SEC.) =  18.19
  LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30809.00 =   2696.00 FEET.
=========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =      49.3  TC(MIN.) =     15.11
  EFFECTIVE AREA(ACRES)  =      49.33  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      92.46
=========================================================================
=========================================================================
  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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                       Analysis prepared by:

                    Michael Baker International
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  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 9A EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 50-YR EV MARCH 2019 CCHIU                                            *
  **********************************************************************

   FILE NAME: X39A50EV.DAT
   TIME/DATE OF STUDY: 07:46 03/25/2019
 ========================================================================
   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;  0.170
   *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   60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  30900.00 TO NODE  30901.00 IS CODE =  21
 --------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
  ELEVATION DATA: UPSTREAM(FEET) =    558.00  DOWNSTREAM(FEET) =    510.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.464
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.952
  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  10.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  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  30901.00 TO NODE  30902.00 IS CODE =  51
 --------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    510.00  DOWNSTREAM(FEET) =    470.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   107.00    CHANNEL SLOPE = 0.3738
  CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.921
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS
      LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       1.02     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) =       2.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.94
  AVERAGE FLOW DEPTH(FEET) =   0.36    TRAVEL TIME(MIN.) =   0.26
  Tc(MIN.) =   10.72
  SUBAREA AREA(ACRES) =    1.02       SUBAREA RUNOFF(CFS) =    2.42
  EFFECTIVE AREA(ACRES) =      1.62      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.6         PEAK FLOW RATE(CFS) =       3.82

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.41    FLOW VELOCITY(FEET/SEC.) =    7.61
   LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30902.00 =     432.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30902.00 TO NODE  30903.00 IS CODE =  51
   ---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    445.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   126.00   CHANNEL SLOPE = 0.1984
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.881
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap      SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -          1.53      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) =      5.60
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.62
   AVERAGE FLOW DEPTH(FEET) =  0.53    TRAVEL TIME(MIN.) =   0.32
   Tc(MIN.) =   11.04
   SUBAREA AREA(ACRES) =    1.53       SUBAREA RUNOFF(CFS) =    3.55
   EFFECTIVE AREA(ACRES) =    3.15      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) =      7.32

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.59    FLOW VELOCITY(FEET/SEC.) =    7.00
   LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30903.00 =     558.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30903.00 TO NODE  30904.00 IS CODE =  51
   ---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    445.00  DOWNSTREAM(FEET) =    404.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   252.00   CHANNEL SLOPE = 0.1627
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 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             -          3.07      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) =     10.78
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.24
   AVERAGE FLOW DEPTH(FEET) =  0.70    TRAVEL TIME(MIN.) =   0.58
   Tc(MIN.) =   11.62
   SUBAREA AREA(ACRES) =    3.07       SUBAREA RUNOFF(CFS) =    6.92
   EFFECTIVE AREA(ACRES) =    6.22      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       6.2         PEAK FLOW RATE(CFS) =     14.04
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.78    FLOW VELOCITY(FEET/SEC.) =    7.67
   LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30904.00 =     810.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  30904.00 TO NODE  30905.00 IS CODE =  51
   ---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    404.00  DOWNSTREAM(FEET) =    356.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   544.00   CHANNEL SLOPE = 0.0882
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 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             -          4.76      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) =     19.05
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.62
   AVERAGE FLOW DEPTH(FEET) =  0.98    TRAVEL TIME(MIN.) =   1.37
   Tc(MIN.) =   12.99
   SUBAREA AREA(ACRES) =    4.76       SUBAREA RUNOFF(CFS) =   10.03
   EFFECTIVE AREA(ACRES) =   10.98      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      11.0         PEAK FLOW RATE(CFS) =     23.12

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.06    FLOW VELOCITY(FEET/SEC.) =    6.91
   LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30905.00 =    1354.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  30905.00 TO NODE  30906.00 IS CODE =  51
   ---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    356.00  DOWNSTREAM(FEET) =    332.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   335.00   CHANNEL SLOPE = 0.0716
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.543
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp         Ap      SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         12.78      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) =     36.02
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.17
   AVERAGE FLOW DEPTH(FEET) =  1.29    TRAVEL TIME(MIN.) =   0.78
   Tc(MIN.) =   13.77
   SUBAREA AREA(ACRES) =   12.78       SUBAREA RUNOFF(CFS) =   25.80
   EFFECTIVE AREA(ACRES) =   23.76      AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =       23.8         PEAK FLOW RATE(CFS) =      47.96


END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.44   FLOW VELOCITY(FEET/SEC.) =   7.72
LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30906.00 =   1689.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  30906.00 TO NODE  30907.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    332.00  DOWNSTREAM(FEET) =    305.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  447.00   CHANNEL SLOPE = 0.0604
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.443
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        7.40     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) =     55.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.28
  AVERAGE FLOW DEPTH(FEET) =  1.41   TRAVEL TIME(MIN.) =   0.80
  Tc(MIN.) =  14.57
  SUBAREA AREA(ACRES) =     7.40       SUBAREA RUNOFF(CFS) =   14.28
  EFFECTIVE AREA(ACRES) =     31.16     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      31.2        PEAK FLOW RATE(CFS) =      60.11


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.45   FLOW VELOCITY(FEET/SEC.) =   9.50
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30907.00 =   2136.00 FEET.
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       31.2  TC(MIN.) =    14.57
  EFFECTIVE AREA(ACRES) =     31.16  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       60.11
===============================================================================
===============================================================================
  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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                        Analysis prepared by:

                     Michael Baker International
                    5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 9B EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 50-YR EV MARCH 2019 CCHIU                                           *
  *********************************************************************

  FILE NAME: X39B50EV.DAT
  TIME/DATE OF STUDY: 08:00 03/25/2019
 ========================================================================
   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;  0.170
  *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  60.0   30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   2  50.0   25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   3  40.0   20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   4  30.0   15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   5  20.0   10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  30910.00 TO NODE  30911.00 IS CODE =  21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
   ELEVATION DATA: UPSTREAM(FEET) =    479.00  DOWNSTREAM(FEET) =    428.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.414
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.959
   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.)
   NATURAL FAIR COVER
   "GRASS"                   -       0.34      0.30     1.000    0  10.41
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =      0.81
   TOTAL AREA(ACRES) =       0.34   PEAK FLOW RATE(CFS) =      0.81


 ************************************************************************
   FLOW PROCESS FROM NODE  30911.00 TO NODE  30912.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    428.00  DOWNSTREAM(FEET) =    380.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    91.00   CHANNEL SLOPE = 0.5275
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.932
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap    SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
   USER-DEFINED               -       0.87      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) =       1.84
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.14
   AVERAGE FLOW DEPTH(FEET) =  0.29   TRAVEL TIME(MIN.) =   0.21
   Tc(MIN.) =   10.63
   SUBAREA AREA(ACRES) =    0.87       SUBAREA RUNOFF(CFS) =   2.05
   EFFECTIVE AREA(ACRES) =     1.20      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       1.2        PEAK FLOW RATE(CFS) =       2.85

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   7.93
   LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30912.00 =    420.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30912.00 TO NODE  30913.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    380.00  DOWNSTREAM(FEET) =    372.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   91.00   CHANNEL SLOPE =  0.0879
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
   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     -
   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) =       3.79
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.38
   AVERAGE FLOW DEPTH(FEET) =  0.54   TRAVEL TIME(MIN.) =   0.35
   Tc(MIN.) =  10.97
   SUBAREA AREA(ACRES) =    0.80       SUBAREA RUNOFF(CFS) =    1.87
   EFFECTIVE AREA(ACRES) =     2.01     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       2.0        PEAK FLOW RATE(CFS) =      4.68

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   4.69
   LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30913.00 =    511.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30913.00 TO NODE  30914.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =    355.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  111.00   CHANNEL SLOPE =  0.1532
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.852
   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     -
   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) =       6.18
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.19
   AVERAGE FLOW DEPTH(FEET) =  0.58   TRAVEL TIME(MIN.) =   0.30
   Tc(MIN.) =  11.27
   SUBAREA AREA(ACRES) =    1.30       SUBAREA RUNOFF(CFS) =    3.00
   EFFECTIVE AREA(ACRES) =     3.31     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       3.3        PEAK FLOW RATE(CFS) =      7.61

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.63   FLOW VELOCITY(FEET/SEC.) =   6.42
   LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30914.00 =    622.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30914.00 TO NODE  30915.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    340.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  236.00   CHANNEL SLOPE =  0.0636
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.754
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -        1.86       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) =       9.66
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.96
   AVERAGE FLOW DEPTH(FEET) =  0.81   TRAVEL TIME(MIN.) =   0.79
   Tc(MIN.) =  12.06
   SUBAREA AREA(ACRES) =    1.86       SUBAREA RUNOFF(CFS) =    4.10
   EFFECTIVE AREA(ACRES) =     5.17     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       5.2        PEAK FLOW RATE(CFS) =     11.42

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.86   FLOW VELOCITY(FEET/SEC.) =   5.15
   LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30915.00 =    858.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30915.00 TO NODE  30916.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    340.00  DOWNSTREAM(FEET) =    317.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  366.00   CHANNEL SLOPE =  0.0628
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.613
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -        2.39       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) =      13.90
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.38
   AVERAGE FLOW DEPTH(FEET) =  0.93   TRAVEL TIME(MIN.) =   1.13
   Tc(MIN.) =  13.20
   SUBAREA AREA(ACRES) =    2.39       SUBAREA RUNOFF(CFS) =    4.97
   EFFECTIVE AREA(ACRES) =     7.56     AREA-AVERAGED Fm(INCH/HR) =   0.30
```

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 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        7.6        PEAK FLOW RATE(CFS) =       15.73


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.97   FLOW VELOCITY(FEET/SEC.) =   5.55
 LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30916.00 =    1224.00 FEET.

********************************************************************************
 FLOW PROCESS FROM NODE  30916.00 TO NODE  30917.00 IS CODE =  51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    317.00  DOWNSTREAM(FEET) =    295.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   346.00   CHANNEL SLOPE = 0.0636
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  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              -        4.70      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) =     20.37
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.98
 AVERAGE FLOW DEPTH(FEET) =  1.07   TRAVEL TIME(MIN.) =   0.96
 Tc(MIN.) =   14.16
 SUBAREA AREA(ACRES) =     4.70        SUBAREA RUNOFF(CFS) =    9.28
 EFFECTIVE AREA(ACRES) =     12.26     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       12.3        PEAK FLOW RATE(CFS) =       24.20


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.14   FLOW VELOCITY(FEET/SEC.) =   6.21
 LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30917.00 =    1570.00 FEET.
==============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        12.3  TC(MIN.) =     14.16
 EFFECTIVE AREA(ACRES) =      12.26  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =       24.20
==============================================================================
==============================================================================
 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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                          Analysis prepared by:

                        Michael Baker International
                       5 Hutton Centre Drive Suite 500
                            Santa Ana, CA92707


   ************************** DESCRIPTION OF STUDY **************************
  * RMV PA-3 WATERSHED 10 EXISTING CONDITION                              *
  * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
  * 50-YR EV MARCH 2019 CCHIU                                             *
   ***********************************************************************

   FILE NAME: X31050EV.DAT
   TIME/DATE OF STUDY: 08:19 03/25/2019
================================================================================
   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; 0.170
   *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  60.0   30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    2  50.0   25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    3  40.0   20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    4  30.0   15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    5  20.0   10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31000.00 TO NODE  31001.00 IS CODE =  21
--------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
   ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM(FEET) =    455.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.457
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.165
   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
   "GRASS"                    -        0.99     0.30      1.000     0   9.46
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       2.55
   TOTAL AREA(ACRES) =       0.99   PEAK FLOW RATE(CFS) =       2.55


********************************************************************************
   FLOW PROCESS FROM NODE  31001.00 TO NODE  31002.00 IS CODE =  51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    430.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   222.00   CHANNEL SLOPE = 0.1126
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.985
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap     SCS
       LAND USE             GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        1.27     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) =       4.09
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.98
   AVERAGE FLOW DEPTH(FEET) =   0.52    TRAVEL TIME(MIN.) =   0.74
   Tc(MIN.) =   10.20
   SUBAREA AREA(ACRES) =    1.27        SUBAREA RUNOFF(CFS) =    3.08
   EFFECTIVE AREA(ACRES) =      2.26       AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       2.3         PEAK FLOW RATE(CFS) =      5.47

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.58    FLOW VELOCITY(FEET/SEC.) =   5.34
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31002.00 =    542.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31002.00 TO NODE  31003.00 IS CODE =  51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    430.00  DOWNSTREAM(FEET) =    422.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  159.00   CHANNEL SLOPE =  0.0503
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.906
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap     SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        1.34     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) =     7.05
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.17
   AVERAGE FLOW DEPTH(FEET) =  0.75   TRAVEL TIME(MIN.) =   0.64
   Tc(MIN.) =   10.84
   SUBAREA AREA(ACRES) =    1.34      SUBAREA RUNOFF(CFS) =    3.15
   EFFECTIVE AREA(ACRES) =    3.61     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) =       8.46

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.80    FLOW VELOCITY(FEET/SEC.) =   4.36
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31003.00 =    701.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31003.00 TO NODE  31004.00 IS CODE =  51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    422.00  DOWNSTREAM(FEET) =    379.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  506.00   CHANNEL SLOPE =  0.0850
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.760
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap     SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        2.88     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) =     11.64
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.14
   AVERAGE FLOW DEPTH(FEET) =  0.74   TRAVEL TIME(MIN.) =   1.18
   Tc(MIN.) =   12.02
   SUBAREA AREA(ACRES) =    2.88      SUBAREA RUNOFF(CFS) =    6.37
   EFFECTIVE AREA(ACRES) =    6.48     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) =      14.35
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.80    FLOW VELOCITY(FEET/SEC.) =   7.54
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31004.00 =   1207.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31004.00 TO NODE  31005.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =    365.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  357.00   CHANNEL SLOPE =  0.0392
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  15 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
   USER-DEFINED             -        2.59     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) =     17.07
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.91
   AVERAGE FLOW DEPTH(FEET) =  0.98   TRAVEL TIME(MIN.) =   1.01
   Tc(MIN.) =   13.02
   SUBAREA AREA(ACRES) =    2.59      SUBAREA RUNOFF(CFS) =    5.44
   EFFECTIVE AREA(ACRES) =    9.07     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      9.1        PEAK FLOW RATE(CFS) =      19.06

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.03    FLOW VELOCITY(FEET/SEC.) =   6.05
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31005.00 =   1564.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31005.00 TO NODE  31006.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    365.00  DOWNSTREAM(FEET) =    334.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  696.00   CHANNEL SLOPE =  0.0445
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.423
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap     SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        5.86     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) =     24.67
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.78
   AVERAGE FLOW DEPTH(FEET) =  1.10   TRAVEL TIME(MIN.) =   1.71
   Tc(MIN.) =   14.74
   SUBAREA AREA(ACRES) =    5.86      SUBAREA RUNOFF(CFS) =   11.20
   EFFECTIVE AREA(ACRES) =   14.93     AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       14.9        PEAK FLOW RATE(CFS) =      28.53


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.16   FLOW VELOCITY(FEET/SEC.) =   7.04
 LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31006.00 =    2260.00 FEET.

*******************************************************************************
 FLOW PROCESS FROM NODE  31006.00 TO NODE  31007.00 IS CODE =  51
-----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    334.00  DOWNSTREAM(FEET) =    327.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   175.00   CHANNEL SLOPE = 0.0400
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.383
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED              -        33.75     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) =     60.17
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.15
 AVERAGE FLOW DEPTH(FEET) =  1.57   TRAVEL TIME(MIN.) =   0.36
 Tc(MIN.) =  15.09
 SUBAREA AREA(ACRES) =    33.75        SUBAREA RUNOFF(CFS) =   63.28
 EFFECTIVE AREA(ACRES) =     48.68     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       48.7        PEAK FLOW RATE(CFS) =      91.28


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.84   FLOW VELOCITY(FEET/SEC.) =   9.03
 LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31007.00 =    2435.00 FEET.
=============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       48.7  TC(MIN.) =    15.09
 EFFECTIVE AREA(ACRES) =     48.68  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)   =       91.28
=============================================================================
=============================================================================
 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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                      5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
  * RMV PA-3 WATERSHED 11 EXISTING CONDITION                            *
  * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
  * 50-YR EV MARCH 2019 CCHIU                                           *
  **********************************************************************

  FILE NAME: X31150EV.DAT
  TIME/DATE OF STUDY: 11:03 03/26/2019
================================================================================
   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;  0.170
  *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  60.0    30.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0    0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31100.00 TO NODE  31101.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
  ELEVATION DATA: UPSTREAM(FEET) =    532.00  DOWNSTREAM(FEET) =    475.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.054
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.003
  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"              -          0.34     0.30    1.000    0   10.05
  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) =        0.34    PEAK FLOW RATE(CFS) =        0.84


********************************************************************************
  FLOW PROCESS FROM NODE  31101.00 TO NODE  31102.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    475.00  DOWNSTREAM(FEET) =    455.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   133.00    CHANNEL SLOPE = 0.1504
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040    MAXIMUM DEPTH(FEET) =  20.00
  *  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              -          0.47     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) =        1.40
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.22
  AVERAGE FLOW DEPTH(FEET) =  0.33    TRAVEL TIME(MIN.) =   0.53
  Tc(MIN.) =   10.58
  SUBAREA AREA(ACRES) =       0.47      SUBAREA RUNOFF(CFS) =    1.13
  EFFECTIVE AREA(ACRES) =        0.82     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =          0.8          PEAK FLOW RATE(CFS) =        1.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.38   FLOW VELOCITY(FEET/SEC.) =   4.57
    LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31102.00 =    455.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  31102.00 TO NODE  31103.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    415.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   238.00   CHANNEL SLOPE =  0.1681
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.843
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        0.58      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) =       2.61
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.20
   AVERAGE FLOW DEPTH(FEET) =   0.41   TRAVEL TIME(MIN.) =   0.76
   Tc(MIN.) =   11.34
   SUBAREA AREA(ACRES) =     0.58      SUBAREA RUNOFF(CFS) =    1.33
   EFFECTIVE AREA(ACRES) =      1.40     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         1.4        PEAK FLOW RATE(CFS) =       3.20

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =   5.39
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31103.00 =    693.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  31103.00 TO NODE  31104.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    415.00  DOWNSTREAM(FEET) =    379.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   394.00   CHANNEL SLOPE =  0.0914
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.705
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        1.61      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) =       4.95
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.89
   AVERAGE FLOW DEPTH(FEET) =   0.53   TRAVEL TIME(MIN.) =   1.11
   Tc(MIN.) =   12.46
   SUBAREA AREA(ACRES) =     1.61      SUBAREA RUNOFF(CFS) =    3.49
   EFFECTIVE AREA(ACRES) =      3.01     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) =       6.52
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   6.36
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31104.00 =   1087.00 FEET.


****************************************************************************
   FLOW PROCESS FROM NODE  31104.00 TO NODE  31105.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =    359.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE =  0.0515
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.572
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        5.30      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) =      11.94
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.01
   AVERAGE FLOW DEPTH(FEET) =   0.81   TRAVEL TIME(MIN.) =   1.08
   Tc(MIN.) =   13.53
   SUBAREA AREA(ACRES) =     5.30      SUBAREA RUNOFF(CFS) =   10.83
   EFFECTIVE AREA(ACRES) =      8.31     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         8.3        PEAK FLOW RATE(CFS) =      16.99

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.93   FLOW VELOCITY(FEET/SEC.) =   6.50
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31105.00 =   1475.00 FEET.


****************************************************************************
   FLOW PROCESS FROM NODE  31105.00 TO NODE  31106.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    359.00  DOWNSTREAM(FEET) =    345.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   316.00   CHANNEL SLOPE =  0.0443
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.470
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        2.41      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) =      19.35
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.40
   AVERAGE FLOW DEPTH(FEET) =   1.00   TRAVEL TIME(MIN.) =   0.82
   Tc(MIN.) =   14.36
   SUBAREA AREA(ACRES) =     2.41      SUBAREA RUNOFF(CFS) =    4.72
   EFFECTIVE AREA(ACRES) =     10.72     AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      10.7        PEAK FLOW RATE(CFS) =      20.94

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.03   FLOW VELOCITY(FEET/SEC.) =   6.52
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31106.00 =    1791.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31106.00 TO NODE  31107.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    345.00  DOWNSTREAM(FEET) =    336.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    340.00  CHANNEL SLOPE = 0.0265
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.368
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        11.64     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) =      31.77
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.97
   AVERAGE FLOW DEPTH(FEET) =   1.33   TRAVEL TIME(MIN.) =   0.95
   Tc(MIN.) =   15.31
   SUBAREA AREA(ACRES) =     11.64       SUBAREA RUNOFF(CFS) =   21.66
   EFFECTIVE AREA(ACRES) =      22.36      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      22.4        PEAK FLOW RATE(CFS) =      41.61

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.48   FLOW VELOCITY(FEET/SEC.) =   6.36
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31107.00 =    2131.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31107.00 TO NODE  31108.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    336.00  DOWNSTREAM(FEET) =    325.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    488.00  CHANNEL SLOPE = 0.0225
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.273
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         5.13     0.30      0.939      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.939
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      46.21
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.14
   AVERAGE FLOW DEPTH(FEET) =   1.58   TRAVEL TIME(MIN.) =   1.32
   Tc(MIN.) =   16.63
```

```
   SUBAREA AREA(ACRES) =      5.13       SUBAREA RUNOFF(CFS) =    9.19
   EFFECTIVE AREA(ACRES) =      27.49      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.99
   TOTAL AREA(ACRES) =      27.5        PEAK FLOW RATE(CFS) =      48.89

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.61   FLOW VELOCITY(FEET/SEC.) =   6.25
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31108.00 =    2619.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31108.00 TO NODE  31109.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =    275.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    731.00  CHANNEL SLOPE = 0.0684
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.162
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        10.26     0.30      0.934      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.934
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      57.57
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.95
   AVERAGE FLOW DEPTH(FEET) =   1.55   TRAVEL TIME(MIN.) =   1.53
   Tc(MIN.) =   18.16
   SUBAREA AREA(ACRES) =     10.26       SUBAREA RUNOFF(CFS) =   17.38
   EFFECTIVE AREA(ACRES) =      37.75      AREA-AVERAGED Fm(INCH/HR) =   0.29
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.97
   TOTAL AREA(ACRES) =      37.7        PEAK FLOW RATE(CFS) =      63.53

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.61   FLOW VELOCITY(FEET/SEC.) =   8.12
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31109.00 =    3350.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31109.00 TO NODE  31110.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    275.00  DOWNSTREAM(FEET) =    261.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    641.00  CHANNEL SLOPE = 0.0218
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.025
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        15.10     0.30      0.985      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.985
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      75.29
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.52
```

```
AVERAGE FLOW DEPTH(FEET) =   2.13   TRAVEL TIME(MIN.) =   1.93
Tc(MIN.) =   20.10
SUBAREA AREA(ACRES) =   15.10      SUBAREA RUNOFF(CFS) =   23.51
EFFECTIVE AREA(ACRES) =     52.85     AREA-AVERAGED Fm(INCH/HR) =   0.29
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.98
TOTAL AREA(ACRES) =        52.8       PEAK FLOW RATE(CFS) =      82.39

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  2.20   FLOW VELOCITY(FEET/SEC.) =   5.66
LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31110.00 =   3991.00 FEET.
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =         52.8  TC(MIN.) =     20.10
EFFECTIVE AREA(ACRES) =     52.85  AREA-AVERAGED Fm(INCH/HR)=  0.29
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap = 0.977
PEAK FLOW RATE(CFS)   =        82.39
================================================================================
================================================================================
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 **************************
 * RMV PA-3 WATERSHED 12 EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 50-YR EV MARCH 2019 CCHIU                                            *
 ****************************************************************************

  FILE NAME: X31250EV.DAT
  TIME/DATE OF STUDY: 09:02 03/25/2019
===========================================================================
  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;  0.170
  *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  60.0    30.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31200.00 TO NODE  31201.00 IS CODE =  21
---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
  ELEVATION DATA: UPSTREAM(FEET) =    761.00  DOWNSTREAM(FEET) =    639.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.619
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.405
  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"             -        0.91     0.30      1.000     0   8.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.54
  TOTAL AREA(ACRES) =       0.91   PEAK FLOW RATE(CFS) =      2.54


****************************************************************************
  FLOW PROCESS FROM NODE  31201.00 TO NODE  31202.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    639.00  DOWNSTREAM(FEET) =    595.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE = 0.2009
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.231
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
     LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        0.97     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) =       3.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.99
  AVERAGE FLOW DEPTH(FEET) =  0.46    TRAVEL TIME(MIN.) =   0.61
  Tc(MIN.) =    9.23
  SUBAREA AREA(ACRES) =    0.97      SUBAREA RUNOFF(CFS) =    2.55
  EFFECTIVE AREA(ACRES) =     1.88      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =      4.95

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.51    FLOW VELOCITY(FEET/SEC.) =   6.43
    LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31202.00 =     540.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  31202.00 TO NODE  31203.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    595.00  DOWNSTREAM(FEET) =     589.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE =  0.1200
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.191
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         2.51      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) =       8.21
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.02
  AVERAGE FLOW DEPTH(FEET) =  0.67    TRAVEL TIME(MIN.) =   0.14
  Tc(MIN.) =    9.37
  SUBAREA AREA(ACRES) =     2.51       SUBAREA RUNOFF(CFS) =    6.53
  EFFECTIVE AREA(ACRES) =     4.38     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        4.4         PEAK FLOW RATE(CFS) =     11.41

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.76    FLOW VELOCITY(FEET/SEC.) =   6.58
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31203.00 =     590.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  31203.00 TO NODE  31204.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    589.00  DOWNSTREAM(FEET) =     560.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   308.00   CHANNEL SLOPE =  0.0942
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.991
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         4.19      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) =      16.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.51
  AVERAGE FLOW DEPTH(FEET) =  0.92    TRAVEL TIME(MIN.) =   0.79
  Tc(MIN.) =   10.15
  SUBAREA AREA(ACRES) =     4.19       SUBAREA RUNOFF(CFS) =   10.15
  EFFECTIVE AREA(ACRES) =     8.57     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) =     20.77


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.00    FLOW VELOCITY(FEET/SEC.) =   6.97
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31204.00 =     898.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  31204.00 TO NODE  31205.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    560.00  DOWNSTREAM(FEET) =    537.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   457.00   CHANNEL SLOPE =  0.0503
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.834
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         8.19      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) =      30.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.01
  AVERAGE FLOW DEPTH(FEET) =  1.29    TRAVEL TIME(MIN.) =   1.27
  Tc(MIN.) =   11.42
  SUBAREA AREA(ACRES) =     8.19       SUBAREA RUNOFF(CFS) =   18.68
  EFFECTIVE AREA(ACRES) =    16.76     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       16.8         PEAK FLOW RATE(CFS) =      38.23

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.41    FLOW VELOCITY(FEET/SEC.) =   6.37
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31205.00 =    1355.00 FEET.


***************************************************************************
  FLOW PROCESS FROM NODE  31205.00 TO NODE  31206.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    537.00  DOWNSTREAM(FEET) =    479.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   780.00   CHANNEL SLOPE =  0.0744
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.634
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        15.47      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) =      54.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.07
  AVERAGE FLOW DEPTH(FEET) =  1.50    TRAVEL TIME(MIN.) =   1.61
  Tc(MIN.) =   13.03
  SUBAREA AREA(ACRES) =    15.47       SUBAREA RUNOFF(CFS) =   32.51
  EFFECTIVE AREA(ACRES) =    32.24     AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       32.2      PEAK FLOW RATE(CFS) =      67.72

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.63   FLOW VELOCITY(FEET/SEC.) =   8.52
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31206.00 =   2135.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31206.00 TO NODE  31207.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    479.00  DOWNSTREAM(FEET) =    455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    551.00   CHANNEL SLOPE = 0.0436
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.488
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -       37.81     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) =    104.96
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.80
   AVERAGE FLOW DEPTH(FEET) =   2.12   TRAVEL TIME(MIN.) =   1.18
   Tc(MIN.) =   14.21
   SUBAREA AREA(ACRES) =    37.81      SUBAREA RUNOFF(CFS) =   74.46
   EFFECTIVE AREA(ACRES) =     70.05      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       70.1      PEAK FLOW RATE(CFS) =     137.95

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.35   FLOW VELOCITY(FEET/SEC.) =   8.35
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31207.00 =   2686.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31207.00 TO NODE  31208.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    434.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    743.00   CHANNEL SLOPE = 0.0283
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 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               -       18.18     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) =    154.52
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.29
   AVERAGE FLOW DEPTH(FEET) =   2.66   TRAVEL TIME(MIN.) =   1.70
   Tc(MIN.) =   15.91
```

```
   SUBAREA AREA(ACRES) =      18.18      SUBAREA RUNOFF(CFS) =   33.14
   EFFECTIVE AREA(ACRES) =       88.23      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         88.2      PEAK FLOW RATE(CFS) =     160.78

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.70   FLOW VELOCITY(FEET/SEC.) =   7.36
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31208.00 =   3429.00 FEET.

***********************************************************************************
   FLOW PROCESS FROM NODE  31208.00 TO NODE  31209.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    434.00  DOWNSTREAM(FEET) =    410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    899.00   CHANNEL SLOPE = 0.0267
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.182
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -       42.09     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) =    196.44
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.57
   AVERAGE FLOW DEPTH(FEET) =   2.94   TRAVEL TIME(MIN.) =   1.98
   Tc(MIN.) =   17.89
   SUBAREA AREA(ACRES) =      42.09      SUBAREA RUNOFF(CFS) =   71.30
   EFFECTIVE AREA(ACRES) =      130.32      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        130.3      PEAK FLOW RATE(CFS) =     220.77

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.07   FLOW VELOCITY(FEET/SEC.) =   7.80
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31209.00 =   4328.00 FEET.

***********************************************************************************
   FLOW PROCESS FROM NODE  31209.00 TO NODE  31210.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    390.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    724.00   CHANNEL SLOPE = 0.0276
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.075
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -       27.15     0.30     0.999     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.999
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    242.46
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.09
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  AVERAGE FLOW DEPTH(FEET) =   3.16   TRAVEL TIME(MIN.) =   1.49
  Tc(MIN.) =   19.38
  SUBAREA AREA(ACRES) =    27.15      SUBAREA RUNOFF(CFS) =   43.38
  EFFECTIVE AREA(ACRES) =    157.48     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =    157.5         PEAK FLOW RATE(CFS) =     251.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.21   FLOW VELOCITY(FEET/SEC.) =  8.15
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31210.00 =   5052.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31210.00 TO NODE  31211.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    390.00  DOWNSTREAM(FEET) =    364.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1073.00   CHANNEL SLOPE = 0.0242
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 1.951
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        15.95     0.30     0.963     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.963
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     263.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.85
  AVERAGE FLOW DEPTH(FEET) =   3.34   TRAVEL TIME(MIN.) =   2.28
  Tc(MIN.) =   21.66
  SUBAREA AREA(ACRES) =    15.95      SUBAREA RUNOFF(CFS) =   23.86
  EFFECTIVE AREA(ACRES) =    173.43     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =    173.4         PEAK FLOW RATE(CFS) =     257.80

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.31   FLOW VELOCITY(FEET/SEC.) =  7.82
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31211.00 =   6125.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31211.00 TO NODE  31212.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    364.00  DOWNSTREAM(FEET) =    318.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1175.00   CHANNEL SLOPE = 0.0391
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 1.855
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        81.12     0.30     0.928     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.928
```

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  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     315.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.84
  AVERAGE FLOW DEPTH(FEET) =   3.27   TRAVEL TIME(MIN.) =   1.99
  Tc(MIN.) =   23.65
  SUBAREA AREA(ACRES) =    81.12      SUBAREA RUNOFF(CFS) =  115.11
  EFFECTIVE AREA(ACRES) =    254.55     AREA-AVERAGED Fm(INCH/HR) =   0.29
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =    254.5         PEAK FLOW RATE(CFS) =     358.00

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.43   FLOW VELOCITY(FEET/SEC.) =  10.15
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31212.00 =   7300.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31212.00 TO NODE  31213.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    318.00  DOWNSTREAM(FEET) =    317.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  506.00   CHANNEL SLOPE = 0.0020
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 1.746
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -         1.00     0.30     0.850     -
  USER-DEFINED              -        28.30     0.30     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.995
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     377.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.36
  AVERAGE FLOW DEPTH(FEET) =   6.12   TRAVEL TIME(MIN.) =   2.51
  Tc(MIN.) =   26.16
  SUBAREA AREA(ACRES) =    29.30      SUBAREA RUNOFF(CFS) =   38.18
  EFFECTIVE AREA(ACRES) =    283.85     AREA-AVERAGED Fm(INCH/HR) =   0.29
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =    283.8         PEAK FLOW RATE(CFS) =     371.23

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  6.08   FLOW VELOCITY(FEET/SEC.) =  3.34
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31213.00 =   7806.00 FEET.
=========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     283.8  TC(MIN.) =    26.16
  EFFECTIVE AREA(ACRES) =   283.85  AREA-AVERAGED Fm(INCH/HR)=  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.977
  PEAK FLOW RATE(CFS)   =    371.23
=========================================================================
=========================================================================
  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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                         Analysis prepared by:

                       Michael Baker International
                     5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


 *************************** DESCRIPTION OF STUDY ***********************
 * RMV PA-3 WATERSHED 13 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 50-YR EV MARCH 2019 CCHIU                                           *
 ********************************************************************

   FILE NAME: X31350EV.DAT
   TIME/DATE OF STUDY: 09:06 03/25/2019
================================================================================
   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;  0.170
   *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   60.0    30.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  2   50.0    25.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  3   40.0    20.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  4   30.0    15.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  5   20.0    10.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
```

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   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  31300.00 TO NODE  31301.00 IS CODE =  21
-------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
   ELEVATION DATA: UPSTREAM(FEET) =   535.00  DOWNSTREAM(FEET) =    490.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.423
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.958
   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
   "GRASS"                     -        0.53      0.30     1.000      0   10.42
   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) =        0.53   PEAK FLOW RATE(CFS) =       1.26

*******************************************************************************
   FLOW PROCESS FROM NODE  31301.00 TO NODE  31302.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =    480.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00    CHANNEL SLOPE = 0.0746
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.882
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp        Ap      SCS
       LAND USE              GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED                -        1.00      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) =       2.43
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.69
   AVERAGE FLOW DEPTH(FEET) =   0.47    TRAVEL TIME(MIN.) =   0.61
   Tc(MIN.) =   11.03
   SUBAREA AREA(ACRES) =    1.00        SUBAREA RUNOFF(CFS) =    2.33
   EFFECTIVE AREA(ACRES) =      1.53      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         1.5         PEAK FLOW RATE(CFS) =       3.55

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

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```
   DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   4.08
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31302.00 =     450.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  31302.00 TO NODE  31303.00 IS CODE = 51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    480.00  DOWNSTREAM(FEET) =    469.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  237.00   CHANNEL SLOPE = 0.0464
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.754
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        1.63     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) =       5.36
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.82
   AVERAGE FLOW DEPTH(FEET) =  0.68   TRAVEL TIME(MIN.) =  1.03
   Tc(MIN.) =   12.06
   SUBAREA AREA(ACRES) =    1.63      SUBAREA RUNOFF(CFS) =    3.61
   EFFECTIVE AREA(ACRES) =    3.16      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) =       6.98

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.76   FLOW VELOCITY(FEET/SEC.) =   4.05
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31303.00 =     687.00 FEET.


**********************************************************************
   FLOW PROCESS FROM NODE  31303.00 TO NODE  31304.00 IS CODE = 51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    469.00  DOWNSTREAM(FEET) =    418.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  483.00   CHANNEL SLOPE = 0.1056
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.590
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        3.16     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) =      10.24
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.06
   AVERAGE FLOW DEPTH(FEET) =  0.75   TRAVEL TIME(MIN.) =  1.33
   Tc(MIN.) =   13.39
   SUBAREA AREA(ACRES) =    3.16      SUBAREA RUNOFF(CFS) =    6.52
   EFFECTIVE AREA(ACRES) =    6.32      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       6.3        PEAK FLOW RATE(CFS) =      13.03
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.82   FLOW VELOCITY(FEET/SEC.) =   6.44
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31304.00 =    1170.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31304.00 TO NODE  31305.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    418.00  DOWNSTREAM(FEET) =    381.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  469.00   CHANNEL SLOPE = 0.0789
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.444
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       10.56     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) =      23.23
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.66
   AVERAGE FLOW DEPTH(FEET) =  1.08   TRAVEL TIME(MIN.) =  1.17
   Tc(MIN.) =   14.57
   SUBAREA AREA(ACRES) =   10.56      SUBAREA RUNOFF(CFS) =   20.38
   EFFECTIVE AREA(ACRES) =   16.88      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      16.9        PEAK FLOW RATE(CFS) =      32.58

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.22   FLOW VELOCITY(FEET/SEC.) =   7.25
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31305.00 =    1639.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31305.00 TO NODE  31306.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    381.00  DOWNSTREAM(FEET) =    363.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  398.00   CHANNEL SLOPE = 0.0452
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.363
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       19.15     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) =      50.36
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.13
   AVERAGE FLOW DEPTH(FEET) =  1.44   TRAVEL TIME(MIN.) =  0.82
   Tc(MIN.) =   15.38
   SUBAREA AREA(ACRES) =   19.15      SUBAREA RUNOFF(CFS) =   35.55
   EFFECTIVE AREA(ACRES) =   36.03      AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       36.0       PEAK FLOW RATE(CFS) =       66.89

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.60   FLOW VELOCITY(FEET/SEC.) =   8.74
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31306.00 =    2037.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31306.00 TO NODE  31307.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     363.00  DOWNSTREAM(FEET) =     313.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    836.00   CHANNEL SLOPE = 0.0598
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.263
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         13.40     0.30      0.998     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.998
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       78.73
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.09
   AVERAGE FLOW DEPTH(FEET) =  1.61   TRAVEL TIME(MIN.) =   1.38
   Tc(MIN.) =   16.76
   SUBAREA AREA(ACRES) =     13.40        SUBAREA RUNOFF(CFS) =   23.68
   EFFECTIVE AREA(ACRES) =     49.43      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       49.4       PEAK FLOW RATE(CFS) =       87.35

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.67   FLOW VELOCITY(FEET/SEC.) =  10.39
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31307.00 =    2873.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31307.00 TO NODE  31308.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     313.00  DOWNSTREAM(FEET) =     302.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    763.00   CHANNEL SLOPE = 0.0144
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.117
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         11.99     0.30      0.998     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.998
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       97.16
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.25
   AVERAGE FLOW DEPTH(FEET) =  2.28   TRAVEL TIME(MIN.) =   2.03
   Tc(MIN.) =   18.80
```

```
   SUBAREA AREA(ACRES) =     11.99        SUBAREA RUNOFF(CFS) =   19.62
   EFFECTIVE AREA(ACRES) =     61.43      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       61.4       PEAK FLOW RATE(CFS) =       100.45

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.30   FLOW VELOCITY(FEET/SEC.) =   6.32
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31308.00 =    3636.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31308.00 TO NODE  31309.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     302.00  DOWNSTREAM(FEET) =     289.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1009.00   CHANNEL SLOPE = 0.0129
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 1.959
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         21.83     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) =      116.75
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.28
   AVERAGE FLOW DEPTH(FEET) =  2.49   TRAVEL TIME(MIN.) =   2.68
   Tc(MIN.) =   21.48
   SUBAREA AREA(ACRES) =     21.83        SUBAREA RUNOFF(CFS) =   32.60
   EFFECTIVE AREA(ACRES) =     83.25      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       83.3       PEAK FLOW RATE(CFS) =       124.34

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.55   FLOW VELOCITY(FEET/SEC.) =   6.37
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31309.00 =    4645.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31309.00 TO NODE  31310.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     289.00  DOWNSTREAM(FEET) =     275.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    628.00   CHANNEL SLOPE = 0.0223
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 15 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              -         37.10     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) =      151.02
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.22
```

```
AVERAGE FLOW DEPTH(FEET) =   2.47   TRAVEL TIME(MIN.) =   1.27
Tc(MIN.) =   22.75
SUBAREA AREA(ACRES) =    37.10       SUBAREA RUNOFF(CFS) =    53.36
EFFECTIVE AREA(ACRES) =    120.35      AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =      120.4        PEAK FLOW RATE(CFS) =     173.12

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =   2.60   FLOW VELOCITY(FEET/SEC.) =   8.51
LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31310.00 =    5273.00 FEET.
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =       120.4  TC(MIN.) =      22.75
EFFECTIVE AREA(ACRES) =    120.35  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)   =       173.12
================================================================================
================================================================================
END OF RATIONAL METHOD ANALYSIS
```

```
*******************************************************************************
           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                      Analysis prepared by:

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                       Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 14 EXISTING CONDITION                          *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                             *
 * 50-YR EV MARCH 2019 CCHIU                                         *
 *********************************************************************

  FILE NAME: X31450EV.DAT
  TIME/DATE OF STUDY: 09:09 03/25/2019
================================================================================
   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;  0.170
  *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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31400.00 TO NODE  31401.00 IS CODE =  21
 ---------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ===========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
   ELEVATION DATA: UPSTREAM(FEET) =    868.00  DOWNSTREAM(FEET) =    772.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.143
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.255
   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
   "CHAPARRAL,NARROWLEAF"    -        0.99     0.30      1.000    0    9.14
   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) =       0.99   PEAK FLOW RATE(CFS) =       2.63


*******************************************************************************
   FLOW PROCESS FROM NODE  31401.00 TO NODE  31402.00 IS CODE =  51
 ---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    772.00  DOWNSTREAM(FEET) =    750.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00    CHANNEL SLOPE = 0.1642
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  15 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              -        1.23     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) =       4.20
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.76
   AVERAGE FLOW DEPTH(FEET) =  0.49    TRAVEL TIME(MIN.) =   0.39
   Tc(MIN.) =    9.53
   SUBAREA AREA(ACRES) =    1.23        SUBAREA RUNOFF(CFS) =    3.14
   EFFECTIVE AREA(ACRES) =     2.21      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       2.2         PEAK FLOW RATE(CFS) =       5.67

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   6.16
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31402.00 =     461.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  31402.00 TO NODE  31403.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    750.00  DOWNSTREAM(FEET) =    710.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   318.00   CHANNEL SLOPE = 0.1258
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.957
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -        1.42      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) =      7.37
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.93
   AVERAGE FLOW DEPTH(FEET) =  0.64   TRAVEL TIME(MIN.) =   0.89
   Tc(MIN.) =   10.42
   SUBAREA AREA(ACRES) =    1.42       SUBAREA RUNOFF(CFS) =   3.40
   EFFECTIVE AREA(ACRES) =    3.64     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) =      8.70

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.68   FLOW VELOCITY(FEET/SEC.) =   6.20
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31403.00 =     779.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  31403.00 TO NODE  31404.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    710.00  DOWNSTREAM(FEET) =    688.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   181.00   CHANNEL SLOPE = 0.1215
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.900
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -        1.91      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) =     10.93
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.47
   AVERAGE FLOW DEPTH(FEET) =  0.75   TRAVEL TIME(MIN.) =   0.47
   Tc(MIN.) =   10.89
   SUBAREA AREA(ACRES) =    1.91       SUBAREA RUNOFF(CFS) =   4.46
   EFFECTIVE AREA(ACRES) =    5.55     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      5.5        PEAK FLOW RATE(CFS) =     12.97
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   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.80   FLOW VELOCITY(FEET/SEC.) =   6.79
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31404.00 =     960.00 FEET.


****************************************************************************
   FLOW PROCESS FROM NODE  31404.00 TO NODE  31405.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    688.00  DOWNSTREAM(FEET) =    675.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   237.00   CHANNEL SLOPE = 0.0549
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 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
   USER-DEFINED             -        2.67      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) =     15.98
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.30
   AVERAGE FLOW DEPTH(FEET) =  1.00   TRAVEL TIME(MIN.) =   0.74
   Tc(MIN.) =   11.64
   SUBAREA AREA(ACRES) =    2.67       SUBAREA RUNOFF(CFS) =   6.02
   EFFECTIVE AREA(ACRES) =    8.21     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      8.2        PEAK FLOW RATE(CFS) =     18.54

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.06   FLOW VELOCITY(FEET/SEC.) =   5.52
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31405.00 =    1197.00 FEET.


****************************************************************************
   FLOW PROCESS FROM NODE  31405.00 TO NODE  31406.00 IS CODE = 51
----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =    668.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    78.00   CHANNEL SLOPE = 0.0897
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.785
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -        7.51      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) =     26.94
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.27
   AVERAGE FLOW DEPTH(FEET) =  1.11   TRAVEL TIME(MIN.) =   0.18
   Tc(MIN.) =   11.81
   SUBAREA AREA(ACRES) =    7.51       SUBAREA RUNOFF(CFS) =  16.81
   EFFECTIVE AREA(ACRES) =   15.73     AREA-AVERAGED Fm(INCH/HR) =   0.30
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    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =        15.7         PEAK FLOW RATE(CFS) =       35.18

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 1.23   FLOW VELOCITY(FEET/SEC.) =   7.74
    LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31406.00 =   1275.00 FEET.

*************************************************************************
    FLOW PROCESS FROM NODE  31406.00 TO NODE  31407.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    668.00  DOWNSTREAM(FEET) =     640.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE = 0.0502
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.612
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap       SCS
        LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -        9.79      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) =      45.37
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.65
    AVERAGE FLOW DEPTH(FEET) =   1.51   TRAVEL TIME(MIN.) =   1.40
    Tc(MIN.) =   13.21
    SUBAREA AREA(ACRES) =      9.79        SUBAREA RUNOFF(CFS) =   20.37
    EFFECTIVE AREA(ACRES) =     25.52        AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =        25.5         PEAK FLOW RATE(CFS) =       53.09

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 1.60   FLOW VELOCITY(FEET/SEC.) =   6.92
    LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31407.00 =   1833.00 FEET.

*************************************************************************
    FLOW PROCESS FROM NODE  31407.00 TO NODE  31408.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =     607.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   710.00   CHANNEL SLOPE = 0.0465
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.409
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap       SCS
        LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -       18.46      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) =      70.62
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.22
    AVERAGE FLOW DEPTH(FEET) =   1.81   TRAVEL TIME(MIN.) =   1.64
    Tc(MIN.) =   14.85
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    SUBAREA AREA(ACRES) =       18.46        SUBAREA RUNOFF(CFS) =   35.02
    EFFECTIVE AREA(ACRES) =       43.97      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =        44.0         PEAK FLOW RATE(CFS) =       83.45

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 1.92   FLOW VELOCITY(FEET/SEC.) =   7.55
    LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31408.00 =   2543.00 FEET.

*************************************************************************
    FLOW PROCESS FROM NODE  31408.00 TO NODE  31409.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    607.00  DOWNSTREAM(FEET) =     574.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   674.00   CHANNEL SLOPE = 0.0490
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.298
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap       SCS
        LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED              -        9.15      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) =      91.68
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.86
    AVERAGE FLOW DEPTH(FEET) =   1.97   TRAVEL TIME(MIN.) =   1.43
    Tc(MIN.) =   16.28
    SUBAREA AREA(ACRES) =      9.15        SUBAREA RUNOFF(CFS) =   16.46
    EFFECTIVE AREA(ACRES) =       53.13      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =        53.1         PEAK FLOW RATE(CFS) =       95.54

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 2.00   FLOW VELOCITY(FEET/SEC.) =   7.95
    LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31409.00 =   3217.00 FEET.

*************************************************************************
    FLOW PROCESS FROM NODE  31409.00 TO NODE  31410.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =     540.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   817.00   CHANNEL SLOPE = 0.0416
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 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              -       54.88      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) =     141.95
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.26
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 AVERAGE FLOW DEPTH(FEET) =   2.39   TRAVEL TIME(MIN.) =   1.65
 Tc(MIN.) =   17.93
 SUBAREA AREA(ACRES) =    54.88       SUBAREA RUNOFF(CFS) =   92.82
 EFFECTIVE AREA(ACRES) =    108.01      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      108.0        PEAK FLOW RATE(CFS) =     182.68

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =   2.64   FLOW VELOCITY(FEET/SEC.) =   8.77
 LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31410.00 =    4034.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31410.00 TO NODE  31411.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    500.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1364.00   CHANNEL SLOPE =  0.0293
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  1.993
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -        40.22      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) =    213.34
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.01
 AVERAGE FLOW DEPTH(FEET) =   2.98   TRAVEL TIME(MIN.) =   2.84
 Tc(MIN.) =   20.77
 SUBAREA AREA(ACRES) =    40.22       SUBAREA RUNOFF(CFS) =   61.29
 EFFECTIVE AREA(ACRES) =    148.22      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      148.2        PEAK FLOW RATE(CFS) =     225.89

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =   3.04   FLOW VELOCITY(FEET/SEC.) =   8.14
 LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31411.00 =    5398.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31411.00 TO NODE  31412.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    468.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  985.00   CHANNEL SLOPE =  0.0325
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  1.906
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -       100.09      0.30      1.000      -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
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 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     298.25
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.05
 AVERAGE FLOW DEPTH(FEET) =   3.31   TRAVEL TIME(MIN.) =   1.81
 Tc(MIN.) =   22.58
 SUBAREA AREA(ACRES) =    100.09       SUBAREA RUNOFF(CFS) =  144.69
 EFFECTIVE AREA(ACRES) =    248.31      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      248.3        PEAK FLOW RATE(CFS) =     358.96

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =   3.55   FLOW VELOCITY(FEET/SEC.) =   9.48
 LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31412.00 =    6383.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31412.00 TO NODE  31413.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    468.00  DOWNSTREAM(FEET) =    428.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1135.00   CHANNEL SLOPE =  0.0352
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  1.816
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -        56.18      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) =     397.29
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   10.03
 AVERAGE FLOW DEPTH(FEET) =   3.63   TRAVEL TIME(MIN.) =   1.89
 Tc(MIN.) =   24.47
 SUBAREA AREA(ACRES) =    56.18       SUBAREA RUNOFF(CFS) =   76.63
 EFFECTIVE AREA(ACRES) =    304.49      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      304.5        PEAK FLOW RATE(CFS) =     415.36

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =   3.70   FLOW VELOCITY(FEET/SEC.) =   10.14
 LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31413.00 =    7518.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31413.00 TO NODE  31414.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    428.00  DOWNSTREAM(FEET) =    394.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  888.00   CHANNEL SLOPE =  0.0383
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  1.757
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -        35.49      0.30      1.000      -
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   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) =      438.63
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.61
   AVERAGE FLOW DEPTH(FEET) =  3.71    TRAVEL TIME(MIN.) =   1.40
   Tc(MIN.) =   25.86
   SUBAREA AREA(ACRES) =     35.49       SUBAREA RUNOFF(CFS) =   46.55
   EFFECTIVE AREA(ACRES) =    339.98      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      340.0         PEAK FLOW RATE(CFS) =      445.92

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.74   FLOW VELOCITY(FEET/SEC.) = 10.65
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31414.00 =    8406.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31414.00 TO NODE  31415.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    394.00  DOWNSTREAM(FEET) =     368.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1044.00   CHANNEL SLOPE = 0.0249
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 1.685
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/    SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED            -        26.50      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) =      462.43
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.14
   AVERAGE FLOW DEPTH(FEET) =  4.11    TRAVEL TIME(MIN.) =   1.90
   Tc(MIN.) =   27.77
   SUBAREA AREA(ACRES) =     26.50       SUBAREA RUNOFF(CFS) =   33.02
   EFFECTIVE AREA(ACRES) =    366.48      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      366.5         PEAK FLOW RATE(CFS) =      456.80

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 4.09   FLOW VELOCITY(FEET/SEC.) = 9.12
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31415.00 =    9450.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31415.00 TO NODE  31416.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    368.00  DOWNSTREAM(FEET) =     334.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1318.00   CHANNEL SLOPE = 0.0258
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 1.598
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/    SCS SOIL    AREA       Fp        Ap      SCS
```

```
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED            -        52.53      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) =      487.47
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.39
   AVERAGE FLOW DEPTH(FEET) =  4.16    TRAVEL TIME(MIN.) =   2.34
   Tc(MIN.) =   30.11
   SUBAREA AREA(ACRES) =     52.53       SUBAREA RUNOFF(CFS) =   61.34
   EFFECTIVE AREA(ACRES) =    419.00      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      419.0         PEAK FLOW RATE(CFS) =      489.33

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 4.17   FLOW VELOCITY(FEET/SEC.) = 9.39
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31416.00 =   10768.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31416.00 TO NODE  31417.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    334.00  DOWNSTREAM(FEET) =     325.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1012.00   CHANNEL SLOPE = 0.0089
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 1.536
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/    SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED            -        16.45      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) =      498.49
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.33
   AVERAGE FLOW DEPTH(FEET) =  5.12    TRAVEL TIME(MIN.) =   2.66
   Tc(MIN.) =   32.77
   SUBAREA AREA(ACRES) =     16.45       SUBAREA RUNOFF(CFS) =   18.31
   EFFECTIVE AREA(ACRES) =    435.46      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      435.5         PEAK FLOW RATE(CFS) =      489.33
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 5.09   FLOW VELOCITY(FEET/SEC.) = 6.31
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31417.00 =   11780.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31417.00 TO NODE  31418.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =     301.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1232.00   CHANNEL SLOPE = 0.0195
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  1.481
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
      LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED               -        13.50      0.30      0.694      -
 USER-DEFINED               -        32.00      0.30      1.000      -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.909
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     514.08
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.56
 AVERAGE FLOW DEPTH(FEET) =   4.47    TRAVEL TIME(MIN.) =   2.40
 Tc(MIN.) =   35.17
 SUBAREA AREA(ACRES) =    45.50        SUBAREA RUNOFF(CFS) =   49.49
 EFFECTIVE AREA(ACRES) =     480.96      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.99
 TOTAL AREA(ACRES) =      481.0        PEAK FLOW RATE(CFS) =     512.42

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  4.47   FLOW VELOCITY(FEET/SEC.) =   8.56
 LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31418.00 =   13012.00 FEET.
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       481.0  TC(MIN.) =      35.17
 EFFECTIVE AREA(ACRES) =     480.96  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap = 0.991
 PEAK FLOW RATE(CFS)    =     512.42
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

                      Michael Baker International
                     5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
* RMV PA-3 WATERSHED 15 EXISTING CONDITION                            *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
* 50-YR EV MARCH 2019 CCHIU                                           *
 *********************************************************************

  FILE NAME: X31550EV.DAT
  TIME/DATE OF STUDY: 09:10 03/25/2019
================================================================================
   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; 0.170
  *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  60.0     30.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  2  50.0     25.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  3  40.0     20.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  4  30.0     15.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  5  20.0     10.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31500.00 TO NODE  31501.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   326.00
  ELEVATION DATA: UPSTREAM(FEET) =    416.00  DOWNSTREAM(FEET) =    379.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.043
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.881
  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
  "GRASS"                   -       0.66      0.30     1.000     0   11.04
  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) =       0.66   PEAK FLOW RATE(CFS) =       1.53


********************************************************************************
  FLOW PROCESS FROM NODE  31501.00 TO NODE  31502.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =    375.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   179.00   CHANNEL SLOPE = 0.0223
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.723
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       0.74      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) =       2.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.35
  AVERAGE FLOW DEPTH(FEET) =   0.58    TRAVEL TIME(MIN.) =   1.27
  Tc(MIN.) =   12.32
  SUBAREA AREA(ACRES) =      0.74      SUBAREA RUNOFF(CFS) =    1.62
  EFFECTIVE AREA(ACRES) =      1.40      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       3.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.64   FLOW VELOCITY(FEET/SEC.) =   2.50
    LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31502.00 =    505.00 FEET.


**********************************************************************
  FLOW PROCESS FROM NODE  31502.00 TO NODE  31503.00 IS CODE =  51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    375.00  DOWNSTREAM(FEET) =    374.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  151.00   CHANNEL SLOPE =  0.0066
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.542
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         1.23      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) =      4.29
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  1.73
  AVERAGE FLOW DEPTH(FEET) =  0.91   TRAVEL TIME(MIN.) =   1.46
  Tc(MIN.) =   13.77
  SUBAREA AREA(ACRES) =     1.23      SUBAREA RUNOFF(CFS) =    2.47
  EFFECTIVE AREA(ACRES) =     2.63     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) =      5.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.99   FLOW VELOCITY(FEET/SEC.) =   1.81
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31503.00 =    656.00 FEET.


**********************************************************************
  FLOW PROCESS FROM NODE  31503.00 TO NODE  31504.00 IS CODE =  51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    374.00  DOWNSTREAM(FEET) =    372.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  184.00   CHANNEL SLOPE =  0.0109
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.386
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         2.17      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) =      7.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.39
  AVERAGE FLOW DEPTH(FEET) =  1.01   TRAVEL TIME(MIN.) =   1.28
  Tc(MIN.) =   15.06
  SUBAREA AREA(ACRES) =     2.17      SUBAREA RUNOFF(CFS) =    4.07
  EFFECTIVE AREA(ACRES) =     4.80     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       4.8        PEAK FLOW RATE(CFS) =      9.00
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.10   FLOW VELOCITY(FEET/SEC.) =   2.50
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31504.00 =    840.00 FEET.


***************************************************************************
  FLOW PROCESS FROM NODE  31504.00 TO NODE  31505.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =    360.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  268.00   CHANNEL SLOPE =  0.0448
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.315
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         2.94      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) =     11.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.54
  AVERAGE FLOW DEPTH(FEET) =  0.93   TRAVEL TIME(MIN.) =   0.98
  Tc(MIN.) =   16.04
  SUBAREA AREA(ACRES) =     2.94      SUBAREA RUNOFF(CFS) =    5.34
  EFFECTIVE AREA(ACRES) =     7.74     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       7.7        PEAK FLOW RATE(CFS) =     14.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.99   FLOW VELOCITY(FEET/SEC.) =   4.73
  LONGEST FLOWPATH FROM NODE 31500.00 TO NODE 31505.00 =   1108.00 FEET.


***************************************************************************
  FLOW PROCESS FROM NODE  31505.00 TO NODE  31506.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    360.00  DOWNSTREAM(FEET) =    320.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  622.00   CHANNEL SLOPE =  0.0643
  CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.188
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -         6.03      0.30      0.984     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.984
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     19.17
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.88
  AVERAGE FLOW DEPTH(FEET) =  1.04   TRAVEL TIME(MIN.) =   1.76
  Tc(MIN.) =   17.80
  SUBAREA AREA(ACRES) =     6.03      SUBAREA RUNOFF(CFS) =   10.27
  EFFECTIVE AREA(ACRES) =    13.77     AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.99
  TOTAL AREA(ACRES) =        13.8        PEAK FLOW RATE(CFS) =       23.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.12   FLOW VELOCITY(FEET/SEC.) =   6.17
  LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31506.00 =    1730.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31506.00 TO NODE  31507.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     320.00  DOWNSTREAM(FEET) =     315.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    391.00   CHANNEL SLOPE = 0.0128
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.078
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -         2.67     0.30      0.611    -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.611
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.28
  AVERAGE FLOW DEPTH(FEET) =  1.41   TRAVEL TIME(MIN.) =   1.52
  Tc(MIN.) =   19.33
  SUBAREA AREA(ACRES) =     2.67        SUBAREA RUNOFF(CFS) =     4.55
  EFFECTIVE AREA(ACRES) =     16.43      AREA-AVERAGED Fm(INCH/HR) =   0.28
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.93
  TOTAL AREA(ACRES) =        16.4        PEAK FLOW RATE(CFS) =       26.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.43   FLOW VELOCITY(FEET/SEC.) =   4.33
  LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31507.00 =    2121.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31507.00 TO NODE  31508.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     315.00  DOWNSTREAM(FEET) =     313.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    427.00   CHANNEL SLOPE = 0.0047
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 1.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        10.20     0.30      0.527    -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.85
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.18
  AVERAGE FLOW DEPTH(FEET) =  1.91   TRAVEL TIME(MIN.) =   2.24
  Tc(MIN.) =   21.57
```

```
  SUBAREA AREA(ACRES) =       10.20       SUBAREA RUNOFF(CFS) =   16.49
  EFFECTIVE AREA(ACRES) =      26.63      AREA-AVERAGED Fm(INCH/HR) =   0.23
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.78
  TOTAL AREA(ACRES) =        26.6        PEAK FLOW RATE(CFS) =       41.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 2.04   FLOW VELOCITY(FEET/SEC.) =   3.31
  LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31508.00 =    2548.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31508.00 TO NODE  31509.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     313.00  DOWNSTREAM(FEET) =     296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    495.00   CHANNEL SLOPE = 0.0343
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 1.902
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -         8.30     0.30      1.000    -
  USER-DEFINED              -        10.50     0.30      0.500    -
  USER-DEFINED              -         1.60     0.30      0.850    -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.731
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      56.72
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.55
  AVERAGE FLOW DEPTH(FEET) =  1.58   TRAVEL TIME(MIN.) =   1.09
  Tc(MIN.) =   22.66
  SUBAREA AREA(ACRES) =       20.40       SUBAREA RUNOFF(CFS) =   30.90
  EFFECTIVE AREA(ACRES) =      47.03      AREA-AVERAGED Fm(INCH/HR) =   0.23
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.76
  TOTAL AREA(ACRES) =        47.0        PEAK FLOW RATE(CFS) =       70.92

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.72   FLOW VELOCITY(FEET/SEC.) =   8.00
  LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31509.00 =    3043.00 FEET.
=========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =       47.0  TC(MIN.) =      22.66
  EFFECTIVE AREA(ACRES) =      47.03  AREA-AVERAGED Fm(INCH/HR)=  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.757
  PEAK FLOW RATE(CFS)      =      70.92
=========================================================================
=========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                     Michael Baker International
                    5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 16 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 50-YR EV MARCH 2019 CCHIU                                          *
 *********************************************************************

  FILE NAME: X31650EV.DAT
  TIME/DATE OF STUDY: 09:11 03/25/2019
================================================================================
   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;  0.170
  *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  60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31600.00 TO NODE  31601.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
  ELEVATION DATA: UPSTREAM(FEET) =   672.00  DOWNSTREAM(FEET) =    582.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.296
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.211
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap     SCS   Tc
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "GRASS"                   -       0.52     0.30     1.000     0    9.30
  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) =       0.52   PEAK FLOW RATE(CFS) =      1.37


********************************************************************************
  FLOW PROCESS FROM NODE  31601.00 TO NODE  31602.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   582.00  DOWNSTREAM(FEET) =    554.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   229.00   CHANNEL SLOPE = 0.1223
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.997
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap     SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       1.33     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) =      2.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.69
  AVERAGE FLOW DEPTH(FEET) =  0.46   TRAVEL TIME(MIN.) =   0.81
  Tc(MIN.) =   10.11
  SUBAREA AREA(ACRES) =    1.33       SUBAREA RUNOFF(CFS) =    3.23
  EFFECTIVE AREA(ACRES) =      1.86     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       4.50

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.54    FLOW VELOCITY(FEET/SEC.) =   5.21
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31602.00 =    558.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31602.00 TO NODE  31603.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    554.00  DOWNSTREAM(FEET) =    545.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  149.00   CHANNEL SLOPE = 0.0604
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.929
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        2.68     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) =      7.68
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.54
   AVERAGE FLOW DEPTH(FEET) =  0.75    TRAVEL TIME(MIN.) =   0.55
   Tc(MIN.) =   10.66
   SUBAREA AREA(ACRES) =     2.68       SUBAREA RUNOFF(CFS) =    6.35
   EFFECTIVE AREA(ACRES) =    4.54      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        4.5        PEAK FLOW RATE(CFS) =     10.74

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.85    FLOW VELOCITY(FEET/SEC.) =   4.96
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31603.00 =    707.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31603.00 TO NODE  31604.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    525.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  184.00   CHANNEL SLOPE = 0.1087
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.872
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        3.07     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) =     14.30
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.69
   AVERAGE FLOW DEPTH(FEET) =  0.84    TRAVEL TIME(MIN.) =   0.46
   Tc(MIN.) =   11.11
   SUBAREA AREA(ACRES) =     3.07       SUBAREA RUNOFF(CFS) =    7.11
   EFFECTIVE AREA(ACRES) =    7.61      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        7.6        PEAK FLOW RATE(CFS) =     17.62
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.91    FLOW VELOCITY(FEET/SEC.) =   7.05
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31604.00 =    891.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  31604.00 TO NODE  31605.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =    495.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  266.00   CHANNEL SLOPE = 0.1128
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.800
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        4.69     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) =     22.90
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.60
   AVERAGE FLOW DEPTH(FEET) =  1.00    TRAVEL TIME(MIN.) =   0.58
   Tc(MIN.) =   11.70
   SUBAREA AREA(ACRES) =     4.69       SUBAREA RUNOFF(CFS) =   10.55
   EFFECTIVE AREA(ACRES) =   12.30      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       12.3        PEAK FLOW RATE(CFS) =     27.68

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.08    FLOW VELOCITY(FEET/SEC.) =   7.93
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31605.00 =   1157.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  31605.00 TO NODE  31606.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    495.00  DOWNSTREAM(FEET) =    470.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  444.00   CHANNEL SLOPE = 0.0563
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.661
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        8.98     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) =     37.21
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.61
   AVERAGE FLOW DEPTH(FEET) =  1.37    TRAVEL TIME(MIN.) =   1.12
   Tc(MIN.) =   12.82
   SUBAREA AREA(ACRES) =     8.98       SUBAREA RUNOFF(CFS) =   19.07
   EFFECTIVE AREA(ACRES) =   21.28      AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        21.3         PEAK FLOW RATE(CFS) =        45.21

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.48   FLOW VELOCITY(FEET/SEC.) =   6.92
  LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31606.00 =    1601.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31606.00 TO NODE  31607.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =     439.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   763.00   CHANNEL SLOPE = 0.0406
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =    3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.426
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        20.37     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) =      64.72
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.73
  AVERAGE FLOW DEPTH(FEET) =   1.79   TRAVEL TIME(MIN.) =   1.89
  Tc(MIN.) =   14.71
  SUBAREA AREA(ACRES) =     20.37        SUBAREA RUNOFF(CFS) =    38.98
  EFFECTIVE AREA(ACRES) =      41.65       AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        41.6         PEAK FLOW RATE(CFS) =        79.70

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.94   FLOW VELOCITY(FEET/SEC.) =   7.10
  LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31607.00 =    2364.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31607.00 TO NODE  31608.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    439.00  DOWNSTREAM(FEET) =     380.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1396.00   CHANNEL SLOPE = 0.0423
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =    3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.192
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        25.28     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) =     101.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.63
  AVERAGE FLOW DEPTH(FEET) =   2.10   TRAVEL TIME(MIN.) =   3.05
  Tc(MIN.) =   17.76
```

```
  SUBAREA AREA(ACRES) =     25.28        SUBAREA RUNOFF(CFS) =    43.04
  EFFECTIVE AREA(ACRES) =      66.93       AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        66.9         PEAK FLOW RATE(CFS) =       113.95

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 2.20   FLOW VELOCITY(FEET/SEC.) =   7.85
  LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31608.00 =    3760.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31608.00 TO NODE  31609.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    380.00  DOWNSTREAM(FEET) =     350.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   715.00   CHANNEL SLOPE = 0.0420
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =    3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.086
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        19.63     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) =     129.73
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.11
  AVERAGE FLOW DEPTH(FEET) =   2.31   TRAVEL TIME(MIN.) =   1.47
  Tc(MIN.) =   19.22
  SUBAREA AREA(ACRES) =     19.63        SUBAREA RUNOFF(CFS) =    31.56
  EFFECTIVE AREA(ACRES) =      86.56       AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        86.6         PEAK FLOW RATE(CFS) =       139.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 2.38   FLOW VELOCITY(FEET/SEC.) =   8.22
  LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31609.00 =    4475.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  31609.00 TO NODE  31610.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =     325.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   948.00   CHANNEL SLOPE = 0.0264
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =    3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 1.960
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        17.36     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) =     152.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.09
```

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  AVERAGE FLOW DEPTH(FEET) =   2.68    TRAVEL TIME(MIN.) =   2.23
  Tc(MIN.) =  21.45
  SUBAREA AREA(ACRES) =   17.36      SUBAREA RUNOFF(CFS) =   25.94
  EFFECTIVE AREA(ACRES) =    103.92     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       103.9      PEAK FLOW RATE(CFS) =     155.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.70   FLOW VELOCITY(FEET/SEC.) =  7.11
  LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31610.00 =   5423.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  31610.00 TO NODE  31611.00 IS CODE = 51
  -----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  =============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =     310.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1182.00   CHANNEL SLOPE = 0.0127
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  1.829
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       69.76     0.30     0.990     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.990
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     203.39
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.18
  AVERAGE FLOW DEPTH(FEET) =   3.07    TRAVEL TIME(MIN.) =   2.74
  Tc(MIN.) =  24.20
  SUBAREA AREA(ACRES) =   69.76      SUBAREA RUNOFF(CFS) =   96.16
  EFFECTIVE AREA(ACRES) =    173.68     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       173.7      PEAK FLOW RATE(CFS) =     239.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.27   FLOW VELOCITY(FEET/SEC.) =  7.46
  LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31611.00 =   6605.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  31611.00 TO NODE  31612.00 IS CODE = 51
  -----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  =============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    310.00  DOWNSTREAM(FEET) =     308.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  164.00   CHANNEL SLOPE = 0.0122
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  1.811
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       17.90     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) =      251.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.45
  AVERAGE FLOW DEPTH(FEET) =   3.35    TRAVEL TIME(MIN.) =   0.37
  Tc(MIN.) =  24.56
  SUBAREA AREA(ACRES) =   17.90      SUBAREA RUNOFF(CFS) =   24.34
  EFFECTIVE AREA(ACRES) =    191.58     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       191.6      PEAK FLOW RATE(CFS) =     260.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.40   FLOW VELOCITY(FEET/SEC.) =  7.52
  LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31612.00 =   6769.00 FEET.
  =============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      191.6  TC(MIN.) =     24.56
  EFFECTIVE AREA(ACRES) =    191.58  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap = 0.996
  PEAK FLOW RATE(CFS)   =      260.73
  =============================================================================
  =============================================================================
  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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                       Analysis prepared by:

                     Michael Baker International
                    5 Hutton Centre Drive Suite 500
                        Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY ************************
 * RMV PA-3 WATERSHED 17A EXISTING CONDITION                          *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 50-YR EV MARCH 2019 CCHIU                                          *
  ********************************************************************

  FILE NAME: X17A50EV.DAT
  TIME/DATE OF STUDY: 07:25 03/25/2019
 ====================================================================
   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;  0.170
  *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   60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  2   50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  3   40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  4   30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  5   20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31700.00 TO NODE  31701.00 IS CODE =  21
 --------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ====================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
   ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    515.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.410
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.835
   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
   "GRASS"                  -        0.43      0.30     1.000     0   11.41
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =       0.97
   TOTAL AREA(ACRES) =        0.43   PEAK FLOW RATE(CFS) =       0.97

 **********************************************************************
   FLOW PROCESS FROM NODE  31701.00 TO NODE  31702.00 IS CODE =  51
 --------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    515.00  DOWNSTREAM(FEET) =    490.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   218.00   CHANNEL SLOPE = 0.1147
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.740
   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
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.41
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.72
   AVERAGE FLOW DEPTH(FEET) =  0.32    TRAVEL TIME(MIN.) =   0.77
   Tc(MIN.) =   12.18
   SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.88
   EFFECTIVE AREA(ACRES) =        0.83      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =         0.8        PEAK FLOW RATE(CFS) =       1.82

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   5.05
   LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31702.00 =     539.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31702.00 TO NODE  31703.00 IS CODE = 51
   ---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    465.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE = 0.0833
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 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              -        1.55     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) =       3.42
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.19
   AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   1.19
   Tc(MIN.) =   13.37
   SUBAREA AREA(ACRES) =    1.55       SUBAREA RUNOFF(CFS) =    3.20
   EFFECTIVE AREA(ACRES) =    2.38     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      2.4        PEAK FLOW RATE(CFS) =      4.91

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.60   FLOW VELOCITY(FEET/SEC.) =   4.58
   LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31703.00 =     839.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  31703.00 TO NODE  31704.00 IS CODE = 51
   ---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =    462.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    83.00   CHANNEL SLOPE = 0.0361
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.546
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        2.59     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) =       7.53
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.74
   AVERAGE FLOW DEPTH(FEET) =   0.82   TRAVEL TIME(MIN.) =   0.37
   Tc(MIN.) =   13.74
   SUBAREA AREA(ACRES) =    2.59       SUBAREA RUNOFF(CFS) =    5.24
   EFFECTIVE AREA(ACRES) =    4.97     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      5.0        PEAK FLOW RATE(CFS) =     10.05
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.91   FLOW VELOCITY(FEET/SEC.) =   4.04
   LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31704.00 =     922.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  31704.00 TO NODE  31705.00 IS CODE = 51
   -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    462.00  DOWNSTREAM(FEET) =    460.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    60.00   CHANNEL SLOPE = 0.0333
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.517
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        5.22     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) =      15.26
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.36
   AVERAGE FLOW DEPTH(FEET) =   1.08   TRAVEL TIME(MIN.) =   0.23
   Tc(MIN.) =   13.97
   SUBAREA AREA(ACRES) =    5.22       SUBAREA RUNOFF(CFS) =   10.42
   EFFECTIVE AREA(ACRES) =   10.19     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =     10.2        PEAK FLOW RATE(CFS) =     20.34

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.20   FLOW VELOCITY(FEET/SEC.) =   4.69
   LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31705.00 =     982.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  31705.00 TO NODE  31706.00 IS CODE = 51
   -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    375.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   604.00   CHANNEL SLOPE = 0.1407
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.381
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        8.10     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) =      27.92
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.69
   AVERAGE FLOW DEPTH(FEET) =   1.03   TRAVEL TIME(MIN.) =   1.16
   Tc(MIN.) =   15.13
   SUBAREA AREA(ACRES) =    8.10       SUBAREA RUNOFF(CFS) =   15.17
   EFFECTIVE AREA(ACRES) =   18.29     AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        18.3       PEAK FLOW RATE(CFS) =       34.25

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.12   FLOW VELOCITY(FEET/SEC.) =   9.12
 LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31706.00 =    1586.00 FEET.
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        18.3  TC(MIN.) =     15.13
 EFFECTIVE AREA(ACRES) =      18.29  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =        34.25
================================================================================
================================================================================
 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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                          Analysis prepared by:

                        Michael Baker International
                       5 Hutton Centre Drive Suite 500
                           Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 17B EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 50-YR EV MARCH 2019 CCHIU                                            *
 *************************************************************************

  FILE NAME: X17B50EV.DAT
  TIME/DATE OF STUDY: 07:26 03/25/2019
========================================================================
   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;  0.170
  *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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31710.00 TO NODE  31711.00 IS CODE =  21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
  ELEVATION DATA: UPSTREAM(FEET) =    631.00  DOWNSTREAM(FEET) =    605.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.719
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.797
  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
  "CHAPARRAL,BROADLEAF"       -         0.32      0.30      1.000     0   11.72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       0.72
  TOTAL AREA(ACRES) =       0.32   PEAK FLOW RATE(CFS) =       0.72

*************************************************************************
  FLOW PROCESS FROM NODE  31711.00 TO NODE  31712.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    588.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =     71.00   CHANNEL SLOPE = 0.2394
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.767
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp         Ap     SCS
      LAND USE              GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -         0.56      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) =        1.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.97
  AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =    0.24
  Tc(MIN.) =   11.96
  SUBAREA AREA(ACRES) =      0.56        SUBAREA RUNOFF(CFS) =    1.24
  EFFECTIVE AREA(ACRES) =        0.88       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) =      1.96

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   5.45
  LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31712.00 =    391.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  31712.00 TO NODE  31713.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    588.00  DOWNSTREAM(FEET) =    565.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   181.00   CHANNEL SLOPE = 0.1271
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.683
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -       0.31     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) =      2.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.45
  AVERAGE FLOW DEPTH(FEET) =  0.41   TRAVEL TIME(MIN.) =  0.68
  Tc(MIN.) =  12.64
  SUBAREA AREA(ACRES) =     0.31      SUBAREA RUNOFF(CFS) =    0.68
  EFFECTIVE AREA(ACRES) =     1.20     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       1.2         PEAK FLOW RATE(CFS) =      2.57

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   4.59
  LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31713.00 =    572.00 FEET.


***********************************************************************
  FLOW PROCESS FROM NODE  31713.00 TO NODE  31714.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =    545.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   185.00   CHANNEL SLOPE = 0.1081
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.604
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -       1.36     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) =      3.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.83
  AVERAGE FLOW DEPTH(FEET) =  0.52   TRAVEL TIME(MIN.) =  0.64
  Tc(MIN.) =  13.27
  SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =    2.82
  EFFECTIVE AREA(ACRES) =     2.56     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) =      5.30


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   5.20
  LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31714.00 =    757.00 FEET.


***************************************************************************
  FLOW PROCESS FROM NODE  31714.00 TO NODE  31715.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    531.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   128.00   CHANNEL SLOPE = 0.1094
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  15 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
   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
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.81
  AVERAGE FLOW DEPTH(FEET) =  0.68   TRAVEL TIME(MIN.) =  0.37
  Tc(MIN.) =  13.64
  SUBAREA AREA(ACRES) =     2.80      SUBAREA RUNOFF(CFS) =    5.69
  EFFECTIVE AREA(ACRES) =     5.35     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       5.4         PEAK FLOW RATE(CFS) =     10.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.76   FLOW VELOCITY(FEET/SEC.) =   6.28
  LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31715.00 =    885.00 FEET.


***************************************************************************
  FLOW PROCESS FROM NODE  31715.00 TO NODE  31716.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM(FEET) =    507.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00   CHANNEL SLOPE = 0.0889
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  15 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             -       5.95     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) =     16.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.38
  AVERAGE FLOW DEPTH(FEET) =  0.93   TRAVEL TIME(MIN.) =  0.71
  Tc(MIN.) =  14.35
  SUBAREA AREA(ACRES) =     5.95      SUBAREA RUNOFF(CFS) =   11.62
  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) =      22.08


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.03   FLOW VELOCITY(FEET/SEC.) =   6.90
  LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31716.00 =   1155.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  31716.00 TO NODE  31717.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    507.00  DOWNSTREAM(FEET) =    400.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1020.00   CHANNEL SLOPE = 0.1049
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.288
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
      LAND USE             GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED              -       13.90      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) =     34.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.19
  AVERAGE FLOW DEPTH(FEET) =  1.19   TRAVEL TIME(MIN.) =   2.08
  Tc(MIN.) =   16.42
  SUBAREA AREA(ACRES) =    13.90       SUBAREA RUNOFF(CFS) =   24.87
  EFFECTIVE AREA(ACRES) =    25.20     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       25.2        PEAK FLOW RATE(CFS) =      45.08


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.31   FLOW VELOCITY(FEET/SEC.) =   8.76
  LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31717.00 =   2175.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        25.2  TC(MIN.) =     16.42
  EFFECTIVE AREA(ACRES) =     25.20  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       45.08
==============================================================================
==============================================================================
  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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                    Analysis prepared by:

                  Michael Baker International
                5 Hutton Centre Drive Suite 500
                     Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 18 EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 50-YR EV MARCH 2019 CCHIU                                            *
 ***********************************************************************

  FILE NAME: X31850EV.DAT
  TIME/DATE OF STUDY: 09:36 03/25/2019
================================================================================
  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
  *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;  0.170
  *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   60.0     30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   50.0     25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3   40.0     20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4   30.0     15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5   20.0     10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31800.00 TO NODE  31801.00 IS CODE =  21
---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
  ELEVATION DATA: UPSTREAM(FEET) =    729.00  DOWNSTREAM(FEET) =    630.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.120
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.262
  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
  "CHAPARRAL,BROADLEAF"     -       0.10     0.30    1.000     0   9.12
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"    -       0.10     0.30    1.000     0   9.12
  NATURAL FAIR COVER
  "OPEN BRUSH"             -        1.30     0.30    1.000     0   9.12
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       4.00
  TOTAL AREA(ACRES) =        1.50   PEAK FLOW RATE(CFS) =       4.00


****************************************************************************
  FLOW PROCESS FROM NODE  31801.00 TO NODE  31802.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    597.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   196.00   CHANNEL SLOPE = 0.1684
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =    1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      4.00
  FLOW VELOCITY(FEET/SEC.) =   5.70   FLOW DEPTH(FEET) =   0.48
  TRAVEL TIME(MIN.) =   0.57   Tc(MIN.) =    9.69
  LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31802.00 =    525.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31802.00 TO NODE  31802.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
  MAINLINE Tc(MIN.) =    9.69
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.098
  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              -         1.80     0.30     1.000     -
      USER-DEFINED              -         0.10     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) =   2.00     SUBAREA RUNOFF(CFS) =    5.04
      EFFECTIVE AREA(ACRES) =     3.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
      AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
      TOTAL AREA(ACRES) =       3.5      PEAK FLOW RATE(CFS) =       8.81

*************************************************************************
   FLOW PROCESS FROM NODE  31802.00 TO NODE  31803.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    597.00  DOWNSTREAM(FEET) =    565.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 225.00   CHANNEL SLOPE = 0.1422
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      8.81
   FLOW VELOCITY(FEET/SEC.) =  6.57   FLOW DEPTH(FEET) =  0.67
   TRAVEL TIME(MIN.) =   0.57   Tc(MIN.) =   10.26
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31803.00 =    750.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31803.00 TO NODE  31803.00 IS CODE = 81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   10.26
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.977
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
          LAND USE        GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED          -         2.10     0.30     1.000     -
      USER-DEFINED          -         0.20     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) =   2.30     SUBAREA RUNOFF(CFS) =    5.54
      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) =      13.98

*************************************************************************
   FLOW PROCESS FROM NODE  31803.00 TO NODE  31804.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =    530.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 228.00   CHANNEL SLOPE = 0.1535
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =     13.98
   FLOW VELOCITY(FEET/SEC.) =  7.49   FLOW DEPTH(FEET) =  0.79
```

```
   TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =   10.77
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31804.00 =    978.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31804.00 TO NODE  31804.00 IS CODE = 81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   10.77
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.914
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
          LAND USE        GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED          -         4.10     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) =   4.70     SUBAREA RUNOFF(CFS) =   11.06
      EFFECTIVE AREA(ACRES) =    10.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
      AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
      TOTAL AREA(ACRES) =      10.5      PEAK FLOW RATE(CFS) =      24.71

*************************************************************************
   FLOW PROCESS FROM NODE  31804.00 TO NODE  31805.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    530.00  DOWNSTREAM(FEET) =    498.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 414.00   CHANNEL SLOPE = 0.0773
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =     24.71
   FLOW VELOCITY(FEET/SEC.) =  6.69   FLOW DEPTH(FEET) =  1.11
   TRAVEL TIME(MIN.) =   1.03   Tc(MIN.) =   11.80
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31805.00 =   1392.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31805.00 TO NODE  31805.00 IS CODE = 81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =   11.80
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.787
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
          LAND USE        GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
      USER-DEFINED          -         0.20     0.30     1.000     -
      USER-DEFINED          -         5.70     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) =   6.70     SUBAREA RUNOFF(CFS) =   14.99
      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) =      38.49

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

```
   FLOW PROCESS FROM NODE  31805.00 TO NODE  31806.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    498.00  DOWNSTREAM(FEET) =    454.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE =  0.0649
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =    2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       38.49
   FLOW VELOCITY(FEET/SEC.) =   7.01   FLOW DEPTH(FEET) =   1.35
   TRAVEL TIME(MIN.) =   1.61   Tc(MIN.) =   13.41
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31806.00 =   2070.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31806.00 TO NODE  31806.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =   13.41
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.587
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap      SCS
        LAND USE          GROUP      (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -         2.10      0.30     1.000     -
   USER-DEFINED             -         0.40      0.30     1.000     -
   USER-DEFINED             -         7.90      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) =   10.40      SUBAREA RUNOFF(CFS) =   21.40
   EFFECTIVE AREA(ACRES) =    27.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     27.6      PEAK FLOW RATE(CFS) =      56.80

*****************************************************************************
   FLOW PROCESS FROM NODE  31806.00 TO NODE  31819.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    454.00  DOWNSTREAM(FEET) =    410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   737.00   CHANNEL SLOPE =  0.0597
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =    2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       56.80
   FLOW VELOCITY(FEET/SEC.) =   7.49   FLOW DEPTH(FEET) =   1.59
   TRAVEL TIME(MIN.) =   1.64   Tc(MIN.) =   15.05
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31819.00 =   2807.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =   15.05
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.386
   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             -         0.30      0.30     1.000     -
   USER-DEFINED             -         5.60      0.30     1.000     -
   USER-DEFINED             -         0.50      0.30     1.000     -
   USER-DEFINED             -         0.30      0.30     1.000     -
   USER-DEFINED             -         6.30      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) =   13.70      SUBAREA RUNOFF(CFS) =   25.72
   EFFECTIVE AREA(ACRES) =    41.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     41.3      PEAK FLOW RATE(CFS) =      77.54

*****************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE =  81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =   15.05
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.386
   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     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.38
   EFFECTIVE AREA(ACRES) =    41.50   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     41.5      PEAK FLOW RATE(CFS) =      77.92

*****************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 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) =   2.39
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =    41.50
   TOTAL STREAM AREA(ACRES) =     41.50
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      77.92

*****************************************************************************
   FLOW PROCESS FROM NODE  31810.00 TO NODE  31811.00 IS CODE =  21
-------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   395.00
   ELEVATION DATA: UPSTREAM(FEET) =    697.00  DOWNSTREAM(FEET) =    645.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

```
    SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.576
    * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.815
    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   11.58
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
    SUBAREA RUNOFF(CFS) =      0.91
    TOTAL AREA(ACRES) =      0.40    PEAK FLOW RATE(CFS) =       0.91

****************************************************************************
  FLOW PROCESS FROM NODE  31811.00 TO NODE  31812.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =     610.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  148.00   CHANNEL SLOPE = 0.2365
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.91
  FLOW VELOCITY(FEET/SEC.) =   4.39   FLOW DEPTH(FEET) =  0.26
  TRAVEL TIME(MIN.) =   0.56   Tc(MIN.) =   12.14
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31812.00 =    543.00 FEET.
****************************************************************************
  FLOW PROCESS FROM NODE  31812.00 TO NODE  31812.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   12.14
  * 15 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
   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) =    0.30     SUBAREA RUNOFF(CFS) =    0.66
  EFFECTIVE AREA(ACRES) =      0.70   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        0.7      PEAK FLOW RATE(CFS) =      1.54

****************************************************************************
  FLOW PROCESS FROM NODE  31812.00 TO NODE  31813.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =     591.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  176.00   CHANNEL SLOPE = 0.1080
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.54
  FLOW VELOCITY(FEET/SEC.) =   3.77   FLOW DEPTH(FEET) =  0.37
  TRAVEL TIME(MIN.) =   0.78   Tc(MIN.) =   12.92
```

```
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31813.00 =    719.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31813.00 TO NODE  31813.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   12.92
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.648
  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     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.10     SUBAREA RUNOFF(CFS) =    2.32
  EFFECTIVE AREA(ACRES) =      1.80   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        1.8      PEAK FLOW RATE(CFS) =      3.80

****************************************************************************
  FLOW PROCESS FROM NODE  31813.00 TO NODE  31814.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    591.00  DOWNSTREAM(FEET) =     576.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  184.00   CHANNEL SLOPE = 0.0815
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.80
  FLOW VELOCITY(FEET/SEC.) =   4.28   FLOW DEPTH(FEET) =  0.54
  TRAVEL TIME(MIN.) =   0.72   Tc(MIN.) =   13.63
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31814.00 =    903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31814.00 TO NODE  31814.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   13.63
  * 15 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
   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) =    3.50     SUBAREA RUNOFF(CFS) =    7.12
  EFFECTIVE AREA(ACRES) =      5.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.3      PEAK FLOW RATE(CFS) =     10.78

****************************************************************************
  FLOW PROCESS FROM NODE  31814.00 TO NODE  31815.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    576.00  DOWNSTREAM(FEET) =     566.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  120.00   CHANNEL SLOPE = 0.0833
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =   10.78
   FLOW VELOCITY(FEET/SEC.) =  5.64   FLOW DEPTH(FEET) =  0.80
   TRAVEL TIME(MIN.) =  0.35   Tc(MIN.) =  13.99
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31815.00 =   1023.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31815.00 TO NODE  31815.00 IS CODE = 81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =  13.99
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.515
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -         3.10     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) =    3.10     SUBAREA RUNOFF(CFS) =    6.18
   EFFECTIVE AREA(ACRES) =     8.40   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =       8.4      PEAK FLOW RATE(CFS) =    16.75
****************************************************************************
   FLOW PROCESS FROM NODE  31815.00 TO NODE  31816.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    566.00  DOWNSTREAM(FEET) =     544.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.1009
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =     16.75
   FLOW VELOCITY(FEET/SEC.) =  6.73   FLOW DEPTH(FEET) =  0.91
   TRAVEL TIME(MIN.) =  0.54   Tc(MIN.) =  14.53
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31816.00 =   1241.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31816.00 TO NODE  31816.00 IS CODE = 81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =  14.53
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.449
   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               -         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) =    5.80     SUBAREA RUNOFF(CFS) =    11.22
```

```
   EFFECTIVE AREA(ACRES) =     14.20   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =      14.2      PEAK FLOW RATE(CFS) =    27.46
****************************************************************************
   FLOW PROCESS FROM NODE  31816.00 TO NODE  31817.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    544.00  DOWNSTREAM(FEET) =     488.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  668.00   CHANNEL SLOPE = 0.0838
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =     27.46
   FLOW VELOCITY(FEET/SEC.) =  7.12   FLOW DEPTH(FEET) =  1.13
   TRAVEL TIME(MIN.) =  1.56   Tc(MIN.) =  16.09
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31817.00 =   1909.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31817.00 TO NODE  31817.00 IS CODE = 81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
   MAINLINE Tc(MIN.) =  16.09
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.311
   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               -        12.40     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) =   12.50     SUBAREA RUNOFF(CFS) =    22.63
   EFFECTIVE AREA(ACRES) =     26.70   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =      26.7      PEAK FLOW RATE(CFS) =    48.33
****************************************************************************
   FLOW PROCESS FROM NODE  31817.00 TO NODE  31818.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    488.00  DOWNSTREAM(FEET) =     442.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  580.00   CHANNEL SLOPE = 0.0793
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =     48.33
   FLOW VELOCITY(FEET/SEC.) =  8.03   FLOW DEPTH(FEET) =  1.42
   TRAVEL TIME(MIN.) =  1.20   Tc(MIN.) =  17.30
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31818.00 =   2489.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31818.00 TO NODE  31818.00 IS CODE = 81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
```

```
    MAINLINE Tc(MIN.) =   17.30
    *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.225
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap     SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
    USER-DEFINED              -        2.60     0.30     1.000     -
    USER-DEFINED              -       14.90     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) =  17.50     SUBAREA RUNOFF(CFS) =   30.32
    EFFECTIVE AREA(ACRES) =    44.20   AREA-AVERAGED Fm(INCH/HR) = 0.30
    AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
    TOTAL AREA(ACRES) =     44.2      PEAK FLOW RATE(CFS) =     76.57

****************************************************************************
  FLOW PROCESS FROM NODE  31818.00 TO NODE  31819.00 IS CODE = 51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   442.00  DOWNSTREAM(FEET) =    410.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  646.00   CHANNEL SLOPE = 0.0495
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     76.57
  FLOW VELOCITY(FEET/SEC.) =    7.53   FLOW DEPTH(FEET) =   1.84
  TRAVEL TIME(MIN.) =   1.43   Tc(MIN.) =   18.73
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31819.00 =   3135.00 FEET.
****************************************************************************
  FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE = 81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   18.73
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.122
  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              -        0.80     0.30     1.000     -
  USER-DEFINED              -        7.10     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) =   8.20     SUBAREA RUNOFF(CFS) =   13.44
  EFFECTIVE AREA(ACRES) =    52.40   AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =      52.4      PEAK FLOW RATE(CFS) =     85.92
****************************************************************************
  FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 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.) =   18.73
```

```
    RAINFALL INTENSITY(INCH/HR) =   2.12
    AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30
    AREA-AVERAGED Ap =  1.00
    EFFECTIVE STREAM AREA(ACRES) =     52.40
    TOTAL STREAM AREA(ACRES) =      52.40
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      85.92

    ** CONFLUENCE DATA **
    STREAM    Q      Tc    Intensity  Fp(Fm)    Ap    Ae    HEADWATER
    NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)   NODE
      1      77.92  15.05   2.386   0.30( 0.30) 1.00    41.5   31800.00
      2      85.92  18.73   2.122   0.30( 0.30) 1.00    52.4   31810.00

    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     157.01  15.05   2.386   0.30( 0.30) 1.00    83.6   31800.00
      2     153.96  18.73   2.122   0.30( 0.30) 1.00    93.9   31810.00

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =     157.01    Tc(MIN.) =    15.05
    EFFECTIVE AREA(ACRES) =      83.62   AREA-AVERAGED Fm(INCH/HR) = 0.30
    AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
    TOTAL AREA(ACRES) =       93.9
    LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31819.00 =   3135.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31819.00 TO NODE  31820.00 IS CODE = 51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   410.00  DOWNSTREAM(FEET) =    363.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1134.00   CHANNEL SLOPE = 0.0414
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      157.01
  FLOW VELOCITY(FEET/SEC.) =   8.44    FLOW DEPTH(FEET) =   2.49
  TRAVEL TIME(MIN.) =  2.24   Tc(MIN.) =   17.29
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31820.00 =   4269.00 FEET.

    ** PEAK FLOW RATE TABLE **
    STREAM    Q      Tc    Intensity  Fp(Fm)    Ap    Ae    HEADWATER
    NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)      (ACRES)   NODE
      1     157.01  17.29   2.225   0.30( 0.30) 1.00    83.6   31800.00
      2     153.96  20.97   1.983   0.30( 0.30) 1.00    93.9   31810.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     157.01  Tc(MIN.) =   17.29
  AREA-AVERAGED Fm(INCH/HR) = 0.30  AREA-AVERAGED Fp(INCH/HR) = 0.30
  AREA-AVERAGED Ap = 1.00  EFFECTIVE AREA(ACRES) =      83.62

****************************************************************************
  FLOW PROCESS FROM NODE  31820.00 TO NODE  31820.00 IS CODE = 81
--------------------------------------------------------------------------------
```

```
      >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   MAINLINE Tc(MIN.) =   17.29
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.225
   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              -        2.30     0.30     1.000     -
   USER-DEFINED              -        1.70     0.30     1.000     -
   USER-DEFINED              -        3.30     0.30     1.000     -
   USER-DEFINED              -        2.50     0.30     1.000     -
   USER-DEFINED              -        8.50     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) =   18.70     SUBAREA RUNOFF(CFS) =   32.40
   EFFECTIVE AREA(ACRES) =   102.32   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =    112.6     PEAK FLOW RATE(CFS) =    177.27

******************************************************************************
   FLOW PROCESS FROM NODE  31820.00 TO NODE  31820.00 IS CODE =  81
------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   MAINLINE Tc(MIN.) =   17.29
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.225
   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              -        0.80     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) =    1.50     SUBAREA RUNOFF(CFS) =    2.60
   EFFECTIVE AREA(ACRES) =   103.82   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =    114.1     PEAK FLOW RATE(CFS) =    179.87

******************************************************************************
   FLOW PROCESS FROM NODE  31820.00 TO NODE  31821.00 IS CODE =  51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    363.00  DOWNSTREAM(FEET) =    325.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   614.00   CHANNEL SLOPE = 0.0619
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
   CHANNEL FLOW THRU SUBAREA(CFS) =    179.87
   FLOW VELOCITY(FEET/SEC.) = 10.16   FLOW DEPTH(FEET) =   2.43
   TRAVEL TIME(MIN.) =   1.01   Tc(MIN.) =   18.30
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31821.00 =   4883.00 FEET.

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

```
    1    179.87   18.30    2.152  0.30( 0.30) 1.00    103.8   31800.00
    2    172.87   21.99    1.935  0.30( 0.30) 1.00    114.1   31810.00
   NEW PEAK FLOW DATA ARE:
   PEAK FLOW RATE(CFS) =     179.87  Tc(MIN.) =   18.30
   AREA-AVERAGED Fm(INCH/HR) = 0.30  AREA-AVERAGED Fp(INCH/HR) = 0.30
   AREA-AVERAGED Ap = 1.00  EFFECTIVE AREA(ACRES) =    103.82

******************************************************************************
   FLOW PROCESS FROM NODE  31821.00 TO NODE  31821.00 IS CODE =  81
------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   MAINLINE Tc(MIN.) =   18.30
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.152
   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              -        1.40     0.30     1.000     -
   USER-DEFINED              -        0.90     0.30     1.000     -
   USER-DEFINED              -        1.00     0.30     1.000     -
   USER-DEFINED              -        0.50     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) =    4.50     SUBAREA RUNOFF(CFS) =    7.50
   EFFECTIVE AREA(ACRES) =   108.32   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =    118.6     PEAK FLOW RATE(CFS) =    180.60

******************************************************************************
   FLOW PROCESS FROM NODE  31821.00 TO NODE  31821.00 IS CODE =  81
------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   MAINLINE Tc(MIN.) =   18.30
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.152
   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     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA AREA(ACRES) =    0.20     SUBAREA RUNOFF(CFS) =    0.33
   EFFECTIVE AREA(ACRES) =   108.52   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =    118.8     PEAK FLOW RATE(CFS) =    180.93
==============================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =    118.8  TC(MIN.) =    18.30
   EFFECTIVE AREA(ACRES) =   108.52  AREA-AVERAGED Fm(INCH/HR)= 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)   =    180.93

   ** PEAK FLOW RATE TABLE **
    STREAM      Q      Tc   Intensity  Fp(Fm)     Ap     Ae    HEADWATER
    NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
    1    180.93   18.30    2.152  0.30( 0.30) 1.00    108.5   31800.00
```

```
       2       174.78    21.99     1.935  0.30( 0.30) 1.00     118.8    31810.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 *****************************************************************************
           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

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  ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-4 WATERSHED 2 EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 50-YR EV MARCH 2019 CCHIU                                           *
  *********************************************************************

  FILE NAME: X40250EV.DAT
  TIME/DATE OF STUDY: 09:18 03/25/2019
 ===========================================================================
   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;  0.170
  *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  60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40200.00 TO NODE  40201.00 IS CODE =  21
 ---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ===========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   319.00
  ELEVATION DATA: UPSTREAM(FEET) =    647.00  DOWNSTREAM(FEET) =    555.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.085
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.272
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS   Tc
      LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "CHAPARRAL,BROADLEAF"     -        0.30     0.30     1.000    0    9.08
  NATURAL FAIR COVER
  "OPEN BRUSH"             -        0.20     0.30     1.000    0    9.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.34
  TOTAL AREA(ACRES) =       0.50   PEAK FLOW RATE(CFS) =      1.34


 *****************************************************************************
  FLOW PROCESS FROM NODE  40201.00 TO NODE  40202.00 IS CODE =  51
 ---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    555.00  DOWNSTREAM(FEET) =    525.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE = 0.2000
  CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.34
  FLOW VELOCITY(FEET/SEC.) =   4.64   FLOW DEPTH(FEET) =   0.31
  TRAVEL TIME(MIN.) =   0.54   Tc(MIN.) =    9.62
  LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40202.00 =    469.00 FEET.


 *****************************************************************************
  FLOW PROCESS FROM NODE  40202.00 TO NODE  40202.00 IS CODE =  81
 ---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ===========================================================================
  MAINLINE Tc(MIN.) =    9.62
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.118
  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                -        0.10       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) =    0.70      SUBAREA RUNOFF(CFS) =    1.78
 EFFECTIVE AREA(ACRES) =      1.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) =       1.2       PEAK FLOW RATE(CFS) =       3.04

***********************************************************************
 FLOW PROCESS FROM NODE  40202.00 TO NODE  40203.00 IS CODE = 51
-----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =    505.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE =  0.1143
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.04
 FLOW VELOCITY(FEET/SEC.) =  4.63   FLOW DEPTH(FEET) =   0.47
 TRAVEL TIME(MIN.) =   0.63   Tc(MIN.) =   10.25
 LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40203.00 =    644.00 FEET.

***********************************************************************
 FLOW PROCESS FROM NODE  40203.00 TO NODE  40203.00 IS CODE = 81
-----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=======================================================================
 MAINLINE Tc(MIN.) =   10.25
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.978
 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                -        0.10       0.30     1.000      -
 USER-DEFINED                -        0.40       0.30     1.000      -
 USER-DEFINED                -        0.10       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) =    0.70      SUBAREA RUNOFF(CFS) =    1.69
 EFFECTIVE AREA(ACRES) =      1.90   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) =       1.9       PEAK FLOW RATE(CFS) =       4.58

***********************************************************************
 FLOW PROCESS FROM NODE  40203.00 TO NODE  40204.00 IS CODE = 51
-----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    505.00  DOWNSTREAM(FEET) =    493.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE =  0.0550
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       4.58
 FLOW VELOCITY(FEET/SEC.) =  3.87   FLOW DEPTH(FEET) =   0.63
```

```
 TRAVEL TIME(MIN.) =   0.94   Tc(MIN.) =   11.19
 LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40204.00 =    862.00 FEET.

***********************************************************************
 FLOW PROCESS FROM NODE  40204.00 TO NODE  40204.00 IS CODE = 81
-----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=======================================================================
 MAINLINE Tc(MIN.) =   11.19
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.862
 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                -        0.10       0.30     1.000      -
 USER-DEFINED                -        0.30       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) =    1.40      SUBAREA RUNOFF(CFS) =    3.23
 EFFECTIVE AREA(ACRES) =      3.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) =       3.3       PEAK FLOW RATE(CFS) =       7.61

***********************************************************************
 FLOW PROCESS FROM NODE  40204.00 TO NODE  40205.00 IS CODE = 51
-----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    493.00  DOWNSTREAM(FEET) =    472.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE =  0.0963
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
 CHANNEL FLOW THRU SUBAREA(CFS) =       7.61
 FLOW VELOCITY(FEET/SEC.) =  5.42   FLOW DEPTH(FEET) =   0.68
 TRAVEL TIME(MIN.) =   0.67   Tc(MIN.) =   11.86
 LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40205.00 =   1080.00 FEET.

***********************************************************************
 FLOW PROCESS FROM NODE  40205.00 TO NODE  40205.00 IS CODE = 81
-----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=======================================================================
 MAINLINE Tc(MIN.) =   11.86
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.779
 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                -        0.10       0.30     1.000      -
 USER-DEFINED                -        0.30       0.30     1.000      -
 USER-DEFINED                -        1.30       0.30     1.000      -
 USER-DEFINED                -        0.20       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) =    4.69
 EFFECTIVE AREA(ACRES) =      5.40   AREA-AVERAGED Fm(INCH/HR) =  0.30
```

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
TOTAL AREA(ACRES) =   5.4   PEAK FLOW RATE(CFS) =   12.05

****
  FLOW PROCESS FROM NODE 40205.00 TO NODE 40206.00 IS CODE = 51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==
  ELEVATION DATA: UPSTREAM(FEET) =   472.00 DOWNSTREAM(FEET) =   455.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   71.00   CHANNEL SLOPE = 0.2394
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =   12.05
  FLOW VELOCITY(FEET/SEC.) =   8.59   FLOW DEPTH(FEET) = 0.68
  TRAVEL TIME(MIN.) =   0.14   Tc(MIN.) =   12.00
  LONGEST FLOWPATH FROM NODE 40200.00 TO NODE 40206.00 =   1151.00 FEET.

****
  FLOW PROCESS FROM NODE 40206.00 TO NODE 40206.00 IS CODE = 81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
  MAINLINE Tc(MIN.) =   12.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.762
  SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/   SCS SOIL   AREA   Fp   Ap   SCS
       LAND USE   GROUP   (ACRES) (INCH/HR) (DECIMAL)   CN
  USER-DEFINED   -   0.10   0.30   1.000   -
  USER-DEFINED   -   0.30   0.30   1.000   -
  USER-DEFINED   -   0.20   0.30   1.000   -
  USER-DEFINED   -   1.10   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) =   3.80   SUBAREA RUNOFF(CFS) =   8.42
  EFFECTIVE AREA(ACRES) =   9.20   AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =   9.2   PEAK FLOW RATE(CFS) =   20.38

****
  FLOW PROCESS FROM NODE 40206.00 TO NODE 40207.00 IS CODE = 51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==
  ELEVATION DATA: UPSTREAM(FEET) =   455.00 DOWNSTREAM(FEET) =   400.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE = 0.1389
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =   20.38
  FLOW VELOCITY(FEET/SEC.) =   8.02   FLOW DEPTH(FEET) = 0.92
  TRAVEL TIME(MIN.) =   0.82   Tc(MIN.) =   12.82
  LONGEST FLOWPATH FROM NODE 40200.00 TO NODE 40207.00 =   1547.00 FEET.

****
  FLOW PROCESS FROM NODE 40207.00 TO NODE 40207.00 IS CODE = 81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
  MAINLINE Tc(MIN.) =   12.82
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.660
  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   -   0.20   0.30   1.000   -
  USER-DEFINED   -   1.10   0.30   1.000   -
  USER-DEFINED   -   0.90   0.30   1.000   -
  USER-DEFINED   -   2.90   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) =   6.30   SUBAREA RUNOFF(CFS) =   13.38
  EFFECTIVE AREA(ACRES) =   15.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =   15.5   PEAK FLOW RATE(CFS) =   32.92

****
  FLOW PROCESS FROM NODE 40207.00 TO NODE 40208.00 IS CODE = 51

  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==
  ELEVATION DATA: UPSTREAM(FEET) =   400.00 DOWNSTREAM(FEET) =   384.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   452.00   CHANNEL SLOPE = 0.0354
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =   32.92
  FLOW VELOCITY(FEET/SEC.) =   6.71   FLOW DEPTH(FEET) = 1.28
  TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =   13.95
  LONGEST FLOWPATH FROM NODE 40200.00 TO NODE 40208.00 =   1999.00 FEET.

****
  FLOW PROCESS FROM NODE 40208.00 TO NODE 40208.00 IS CODE = 81

  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==
  MAINLINE Tc(MIN.) =   13.95
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.521
  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   -   0.90   0.30   1.000   -
  USER-DEFINED   -   1.70   0.30   1.000   -
  USER-DEFINED   -   0.10   0.30   1.000   -
  USER-DEFINED   -   0.20   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) =   3.00   SUBAREA RUNOFF(CFS) =   6.00
  EFFECTIVE AREA(ACRES) =   18.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =   18.5   PEAK FLOW RATE(CFS) =   36.97

****

```
    FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   13.95
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.521
   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              -          1.30     0.30      1.000     -
   USER-DEFINED              -          1.60     0.30      1.000     -
   USER-DEFINED              -          0.90     0.30      1.000     -
   USER-DEFINED              -          2.10     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) =   7.20      SUBAREA RUNOFF(CFS) =   14.39
   EFFECTIVE AREA(ACRES) =     25.70   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      25.7       PEAK FLOW RATE(CFS) =      51.36

*******************************************************************************
    FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   13.95
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.521
   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              -          0.20     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) =   2.80      SUBAREA RUNOFF(CFS) =    5.60
   EFFECTIVE AREA(ACRES) =     28.50   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      28.5       PEAK FLOW RATE(CFS) =      56.96


*******************************************************************************
    FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   13.95
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.521
   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      0.100     -
   USER-DEFINED              -          0.10     0.30      0.500     -
   USER-DEFINED              -          1.60     0.30      1.000     -
   USER-DEFINED              -          1.20     0.30      1.000     -
   USER-DEFINED              -          0.20     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 =  0.852
   SUBAREA AREA(ACRES) =   4.60      SUBAREA RUNOFF(CFS) =    9.38
   EFFECTIVE AREA(ACRES) =     33.10   AREA-AVERAGED Fm(INCH/HR) =  0.29
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.98
   TOTAL AREA(ACRES) =      33.1       PEAK FLOW RATE(CFS) =      66.34

*******************************************************************************
    FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   13.95
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.521
   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) =    0.80
   EFFECTIVE AREA(ACRES) =     33.50   AREA-AVERAGED Fm(INCH/HR) =  0.29
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.98
   TOTAL AREA(ACRES) =      33.5       PEAK FLOW RATE(CFS) =      67.14
================================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =       33.5  TC(MIN.) =      13.95
   EFFECTIVE AREA(ACRES) =      33.50  AREA-AVERAGED Fm(INCH/HR)=  0.29
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.980
   PEAK FLOW RATE(CFS)   =       67.14
================================================================================
================================================================================
   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 **************************
 * RMV PA-4 WATERSHED 3 EXISTING CONDITION                                *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 50-YR EV MARCH 2019 CCHIU                                              *
  **********************************************************************

   FILE NAME: X40350EV.DAT
   TIME/DATE OF STUDY: 09:15 03/25/2019
================================================================================
   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; 0.170
   *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  60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
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SECOND COLUMN

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   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  40300.00 TO NODE  40301.00 IS CODE =  21
   ----------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
   ============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
   ELEVATION DATA: UPSTREAM(FEET) =    790.00  DOWNSTREAM(FEET) =    720.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.541
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.141
   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
   "CHAPARRAL,BROADLEAF"     -       0.39     0.30     1.000    0    9.54
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =      1.01
   TOTAL AREA(ACRES) =       0.39   PEAK FLOW RATE(CFS) =      1.01


********************************************************************************
   FLOW PROCESS FROM NODE  40301.00 TO NODE  40302.00 IS CODE =  51
   ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    720.00  DOWNSTREAM(FEET) =    675.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   191.00   CHANNEL SLOPE = 0.2356
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.995
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap     SCS
      LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       0.88     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) =      2.08
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.48
   AVERAGE FLOW DEPTH(FEET) =   0.36    TRAVEL TIME(MIN.) =    0.58
   Tc(MIN.) =   10.12
   SUBAREA AREA(ACRES) =     0.88      SUBAREA RUNOFF(CFS) =    2.14
   EFFECTIVE AREA(ACRES) =      1.28     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) =       3.10

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
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   DEPTH(FEET) =  0.41   FLOW VELOCITY(FEET/SEC.) =   6.00
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40302.00 =    507.00 FEET.


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   FLOW PROCESS FROM NODE  40302.00 TO NODE  40303.00 IS CODE = 51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =    625.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   179.00   CHANNEL SLOPE = 0.2793
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.941
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         0.84      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) =      4.09
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.88
   AVERAGE FLOW DEPTH(FEET) =  0.45   TRAVEL TIME(MIN.) =   0.43
   Tc(MIN.) =   10.56
   SUBAREA AREA(ACRES) =     0.84      SUBAREA RUNOFF(CFS) =    1.99
   EFFECTIVE AREA(ACRES) =      2.12     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        2.1        PEAK FLOW RATE(CFS) =       5.03

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.48   FLOW VELOCITY(FEET/SEC.) =   7.34
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40303.00 =    686.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  40303.00 TO NODE  40304.00 IS CODE = 51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=====================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    625.00  DOWNSTREAM(FEET) =    557.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   161.00   CHANNEL SLOPE = 0.4224
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 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              -         2.94      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) =      8.48
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.73
   AVERAGE FLOW DEPTH(FEET) =  0.54   TRAVEL TIME(MIN.) =   0.28
   Tc(MIN.) =   10.83
   SUBAREA AREA(ACRES) =     2.94      SUBAREA RUNOFF(CFS) =    6.90
   EFFECTIVE AREA(ACRES) =      5.06     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        5.1        PEAK FLOW RATE(CFS) =       11.86
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   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =  10.52
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40304.00 =    847.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40304.00 TO NODE  40305.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    557.00  DOWNSTREAM(FEET) =    548.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    42.00   CHANNEL SLOPE = 0.2143
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.897
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         1.68      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) =      13.82
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.52
   AVERAGE FLOW DEPTH(FEET) =  0.74   TRAVEL TIME(MIN.) =   0.08
   Tc(MIN.) =   10.91
   SUBAREA AREA(ACRES) =     1.68      SUBAREA RUNOFF(CFS) =    3.92
   EFFECTIVE AREA(ACRES) =      6.73     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =       15.74

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.77   FLOW VELOCITY(FEET/SEC.) =   8.77
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40305.00 =    889.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40305.00 TO NODE  40306.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    548.00  DOWNSTREAM(FEET) =    515.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   217.00   CHANNEL SLOPE = 0.1521
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.843
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         4.67      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) =      21.08
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.33
   AVERAGE FLOW DEPTH(FEET) =  0.92   TRAVEL TIME(MIN.) =   0.43
   Tc(MIN.) =   11.35
   SUBAREA AREA(ACRES) =     4.67      SUBAREA RUNOFF(CFS) =   10.70
   EFFECTIVE AREA(ACRES) =      11.41     AREA-AVERAGED Fm(INCH/HR) =   0.30
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 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      11.4      PEAK FLOW RATE(CFS) =      26.11

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.99   FLOW VELOCITY(FEET/SEC.) =  8.80
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40306.00 =   1106.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  40306.00 TO NODE  40307.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    515.00  DOWNSTREAM(FEET) =    502.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    180.00   CHANNEL SLOPE = 0.0722
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 15 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               -        8.44     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) =     35.57
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.18
 AVERAGE FLOW DEPTH(FEET) =  1.28   TRAVEL TIME(MIN.) =   0.42
 Tc(MIN.) =   11.77
 SUBAREA AREA(ACRES) =     8.44      SUBAREA RUNOFF(CFS) =   18.92
 EFFECTIVE AREA(ACRES) =     19.84     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      19.8      PEAK FLOW RATE(CFS) =      44.49

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.40   FLOW VELOCITY(FEET/SEC.) =  7.58
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40307.00 =   1286.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  40307.00 TO NODE  40308.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    502.00  DOWNSTREAM(FEET) =    469.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    553.00   CHANNEL SLOPE = 0.0597
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 15 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               -       10.07     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) =     55.09
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.46
 AVERAGE FLOW DEPTH(FEET) =  1.57   TRAVEL TIME(MIN.) =   1.24
 Tc(MIN.) =   13.00
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 SUBAREA AREA(ACRES) =     10.07      SUBAREA RUNOFF(CFS) =   21.20
 EFFECTIVE AREA(ACRES) =     29.92     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      29.9      PEAK FLOW RATE(CFS) =      62.95

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.65   FLOW VELOCITY(FEET/SEC.) =  7.70
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40308.00 =   1839.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  40308.00 TO NODE  40309.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    469.00  DOWNSTREAM(FEET) =    433.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    631.00   CHANNEL SLOPE = 0.0571
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 15 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               -        9.09     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) =     71.84
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.82
 AVERAGE FLOW DEPTH(FEET) =  1.75   TRAVEL TIME(MIN.) =   1.34
 Tc(MIN.) =   14.35
 SUBAREA AREA(ACRES) =     9.09      SUBAREA RUNOFF(CFS) =   17.76
 EFFECTIVE AREA(ACRES) =     39.01     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      39.0      PEAK FLOW RATE(CFS) =      76.22

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.79   FLOW VELOCITY(FEET/SEC.) =  7.95
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40309.00 =   2470.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE  40309.00 TO NODE  40310.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    433.00  DOWNSTREAM(FEET) =    406.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    595.00   CHANNEL SLOPE = 0.0454
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.343
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap       SCS
       LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
 USER-DEFINED               -       11.61     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) =     86.90
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.56
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 AVERAGE FLOW DEPTH(FEET) =   1.96   TRAVEL TIME(MIN.) =   1.31
 Tc(MIN.) =   15.66
 SUBAREA AREA(ACRES) =    11.61     SUBAREA RUNOFF(CFS) =   21.35
 EFFECTIVE AREA(ACRES) =     50.62    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      50.6       PEAK FLOW RATE(CFS) =      93.06

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.01   FLOW VELOCITY(FEET/SEC.) =   7.67
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40310.00 =   3065.00 FEET.
*************************************************************************
 FLOW PROCESS FROM NODE  40310.00 TO NODE  40311.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    406.00  DOWNSTREAM(FEET) =     353.00
 CHANNEL LENGTH THRU SUBAREA(FEET) = 1122.00   CHANNEL SLOPE =  0.0472
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.207
 SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -       15.32     0.30     0.897     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.897
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     106.43
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.96
 AVERAGE FLOW DEPTH(FEET) =   1.89   TRAVEL TIME(MIN.) =   1.88
 Tc(MIN.) =   17.54
 SUBAREA AREA(ACRES) =    15.32     SUBAREA RUNOFF(CFS) =   26.73
 EFFECTIVE AREA(ACRES) =     65.94    AREA-AVERAGED Fm(INCH/HR) =   0.29
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   0.98
 TOTAL AREA(ACRES) =      65.9       PEAK FLOW RATE(CFS) =     113.63

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  1.93   FLOW VELOCITY(FEET/SEC.) =  10.14
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40311.00 =   4187.00 FEET.
*************************************************************************
 FLOW PROCESS FROM NODE  40311.00 TO NODE  40312.00 IS CODE = 51
-------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    353.00  DOWNSTREAM(FEET) =     337.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  712.00   CHANNEL SLOPE =  0.0225
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.101
 SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -        7.65     0.30     0.850     -
 USER-DEFINED              -        4.40     0.30     1.000     -
 USER-DEFINED              -        0.89     0.30     0.100     -
```

```
 USER-DEFINED              -        6.82     0.30     0.850     -
 USER-DEFINED              -        5.04     0.30     1.000     -
 USER-DEFINED              -        1.11     0.30     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.885
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     135.03
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.03
 AVERAGE FLOW DEPTH(FEET) =   2.37   TRAVEL TIME(MIN.) =   1.48
 Tc(MIN.) =   19.01
 SUBAREA AREA(ACRES) =    25.91     SUBAREA RUNOFF(CFS) =   42.80
 EFFECTIVE AREA(ACRES) =     91.85    AREA-AVERAGED Fm(INCH/HR) =   0.29
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   0.95
 TOTAL AREA(ACRES) =      91.8       PEAK FLOW RATE(CFS) =     150.11

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.47   FLOW VELOCITY(FEET/SEC.) =   8.22
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40312.00 =   4899.00 FEET.
*************************************************************************
 FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
-------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
 MAINLINE Tc(MIN.) =   19.01
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.101
 SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -        0.04     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) =     0.04     SUBAREA RUNOFF(CFS) =    0.06
 EFFECTIVE AREA(ACRES) =     91.89   AREA-AVERAGED Fm(INCH/HR) =  0.29
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   0.95
 TOTAL AREA(ACRES) =      91.9       PEAK FLOW RATE(CFS) =     150.18

*************************************************************************
 FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
-------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
 MAINLINE Tc(MIN.) =   19.01
 * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.101
 SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
     LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -        1.17     0.30     0.850     -
 USER-DEFINED              -        0.01     0.30     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.851
 SUBAREA AREA(ACRES) =     1.18     SUBAREA RUNOFF(CFS) =    1.96
 EFFECTIVE AREA(ACRES) =     93.07   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   0.95
 TOTAL AREA(ACRES) =      93.1       PEAK FLOW RATE(CFS) =     152.14

*************************************************************************
 FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
-------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   19.01
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.101
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap       SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         0.18      0.30       1.000     -
  USER-DEFINED              -         4.59      0.30       1.000     -
  USER-DEFINED              -         4.27      0.30       0.850     -
  USER-DEFINED              -         3.00      0.30       1.000     -
  USER-DEFINED              -         0.16      0.30       1.000     -
  USER-DEFINED              -         0.22      0.30       0.100     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.932
  SUBAREA AREA(ACRES) =   12.42      SUBAREA RUNOFF(CFS) =   20.36
  EFFECTIVE AREA(ACRES) =    105.49   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      105.5      PEAK FLOW RATE(CFS) =    172.50

********************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   19.01
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.101
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap       SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         2.55      0.30       1.000     -
  USER-DEFINED              -        10.49      0.30       1.000     -
  USER-DEFINED              -         2.87      0.30       0.850     -
  USER-DEFINED              -         3.70      0.30       1.000     -
  USER-DEFINED              -         3.12      0.30       1.000     -
  USER-DEFINED              -         0.54      0.30       1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.981
  SUBAREA AREA(ACRES) =   23.27      SUBAREA RUNOFF(CFS) =   37.84
  EFFECTIVE AREA(ACRES) =    128.76   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      128.8      PEAK FLOW RATE(CFS) =    210.33

********************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   19.01
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.101
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap       SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -         2.13      0.30       1.000     -
  USER-DEFINED              -         0.01      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) =    2.14      SUBAREA RUNOFF(CFS) =    3.47
```

```
  EFFECTIVE AREA(ACRES) =    130.90   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      130.9      PEAK FLOW RATE(CFS) =    213.80
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =      130.9  TC(MIN.) =     19.01
  EFFECTIVE AREA(ACRES) =    130.90   AREA-AVERAGED Fm(INCH/HR)=  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.954
  PEAK FLOW RATE(CFS)    =      213.80
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                   Michael Baker International
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                        Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-4 WATERSHED 4 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 50-YR EV MARCH 2019 CCHIU                                           *
 ************************************************************************

  FILE NAME: X40450EV.DAT
  TIME/DATE OF STUDY: 09:20 03/25/2019
 ========================================================================
   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;  0.170
  *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   60.0    30.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   50.0    25.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  3   40.0    20.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  4   30.0    15.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
  5   20.0    10.0     0.020/0.020/0.020   0.67    2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  40400.00 TO NODE  40401.00 IS CODE =  21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
   ELEVATION DATA: UPSTREAM(FEET) =    928.00  DOWNSTREAM(FEET) =    750.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.081
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.559
   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
   "CHAPARRAL,BROADLEAF"     -         0.75     0.30     1.000      0    8.08
   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) =      0.75   PEAK FLOW RATE(CFS) =      2.21


 ************************************************************************
   FLOW PROCESS FROM NODE  40401.00 TO NODE  40402.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    750.00  DOWNSTREAM(FEET) =    710.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   107.00    CHANNEL SLOPE = 0.3738
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.493
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -         1.17     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) =       3.89
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.75
   AVERAGE FLOW DEPTH(FEET) =   0.41    TRAVEL TIME(MIN.) =   0.23
   Tc(MIN.) =    8.31
   SUBAREA AREA(ACRES) =    1.17       SUBAREA RUNOFF(CFS) =    3.38
   EFFECTIVE AREA(ACRES) =      1.93      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       1.9        PEAK FLOW RATE(CFS) =      5.54

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.47   FLOW VELOCITY(FEET/SEC.) =   8.35
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40402.00 =    434.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  40402.00 TO NODE  40403.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    710.00  DOWNSTREAM(FEET) =    675.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   127.00   CHANNEL SLOPE =  0.2756
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.416
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED            -          1.05       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) =      7.01
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.88
   AVERAGE FLOW DEPTH(FEET) =  0.54   TRAVEL TIME(MIN.) =   0.27
   Tc(MIN.) =    8.58
   SUBAREA AREA(ACRES) =    1.05      SUBAREA RUNOFF(CFS) =    2.94
   EFFECTIVE AREA(ACRES) =    2.97     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) =       8.34

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   8.19
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40403.00 =    561.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  40403.00 TO NODE  40404.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =    650.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   113.00   CHANNEL SLOPE =  0.2212
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.351
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED            -          1.95       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) =     11.02
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.22
   AVERAGE FLOW DEPTH(FEET) =  0.67   TRAVEL TIME(MIN.) =   0.23
   Tc(MIN.) =    8.81
   SUBAREA AREA(ACRES) =    1.95      SUBAREA RUNOFF(CFS) =    5.35
   EFFECTIVE AREA(ACRES) =    4.92     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       4.9        PEAK FLOW RATE(CFS) =      13.52
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.73   FLOW VELOCITY(FEET/SEC.) =   8.51
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40404.00 =    674.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40404.00 TO NODE  40405.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE =  0.1826
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.226
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED            -          2.15       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) =     16.34
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.39
   AVERAGE FLOW DEPTH(FEET) =  0.81   TRAVEL TIME(MIN.) =   0.44
   Tc(MIN.) =    9.24
   SUBAREA AREA(ACRES) =    2.15      SUBAREA RUNOFF(CFS) =    5.65
   EFFECTIVE AREA(ACRES) =    7.07     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       7.1        PEAK FLOW RATE(CFS) =      18.62

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.85   FLOW VELOCITY(FEET/SEC.) =   8.60
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40405.00 =    893.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40405.00 TO NODE  40406.00 IS CODE =  51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =    605.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    43.00   CHANNEL SLOPE =  0.1163
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.199
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED            -          2.90       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) =     22.40
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.64
   AVERAGE FLOW DEPTH(FEET) =  0.99   TRAVEL TIME(MIN.) =   0.09
   Tc(MIN.) =    9.34
   SUBAREA AREA(ACRES) =    2.90      SUBAREA RUNOFF(CFS) =    7.57
   EFFECTIVE AREA(ACRES) =    9.97     AREA-AVERAGED Fm(INCH/HR) =   0.30
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   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       10.0        PEAK FLOW RATE(CFS) =       26.02

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.05   FLOW VELOCITY(FEET/SEC.) =   7.89
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40406.00 =     936.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE  40406.00 TO NODE  40407.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     605.00  DOWNSTREAM(FEET) =     602.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   52.00   CHANNEL SLOPE = 0.0577
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.161
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA      Fp        Ap       SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED               -        4.51      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) =      31.82
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.41
   AVERAGE FLOW DEPTH(FEET) =   1.29   TRAVEL TIME(MIN.) =   0.14
   Tc(MIN.) =   9.47
   SUBAREA AREA(ACRES) =      4.51        SUBAREA RUNOFF(CFS) =   11.61
   EFFECTIVE AREA(ACRES) =      14.48       AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       14.5        PEAK FLOW RATE(CFS) =       37.28

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.36   FLOW VELOCITY(FEET/SEC.) =   6.69
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40407.00 =     988.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE  40407.00 TO NODE  40408.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     602.00  DOWNSTREAM(FEET) =     559.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   533.00   CHANNEL SLOPE = 0.0807
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 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               -        5.99      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) =      44.38
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.90
   AVERAGE FLOW DEPTH(FEET) =   1.37   TRAVEL TIME(MIN.) =   1.12
   Tc(MIN.) =   10.60
```

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   SUBAREA AREA(ACRES) =       5.99        SUBAREA RUNOFF(CFS) =   14.20
   EFFECTIVE AREA(ACRES) =      20.47       AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       20.5        PEAK FLOW RATE(CFS) =       48.55

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.41   FLOW VELOCITY(FEET/SEC.) =   8.09
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40408.00 =    1521.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE  40408.00 TO NODE  40409.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     559.00  DOWNSTREAM(FEET) =     509.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   702.00   CHANNEL SLOPE = 0.0712
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.754
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA      Fp        Ap       SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED               -        6.05      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) =      55.23
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.96
   AVERAGE FLOW DEPTH(FEET) =   1.52   TRAVEL TIME(MIN.) =   1.47
   Tc(MIN.) =   12.07
   SUBAREA AREA(ACRES) =      6.05        SUBAREA RUNOFF(CFS) =   13.36
   EFFECTIVE AREA(ACRES) =      26.51       AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       26.5        PEAK FLOW RATE(CFS) =       58.55

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.55   FLOW VELOCITY(FEET/SEC.) =   8.09
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40409.00 =    2223.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE  40409.00 TO NODE  40447.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     509.00  DOWNSTREAM(FEET) =     482.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   440.00   CHANNEL SLOPE = 0.0614
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 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               -        6.09      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) =      64.95
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.85
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     AVERAGE FLOW DEPTH(FEET) =   1.66   TRAVEL TIME(MIN.) =   0.93
     Tc(MIN.) =   13.00
     SUBAREA AREA(ACRES) =      6.09      SUBAREA RUNOFF(CFS) =   12.80
     EFFECTIVE AREA(ACRES) =      32.60      AREA-AVERAGED Fm(INCH/HR) =   0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
     TOTAL AREA(ACRES) =       32.6       PEAK FLOW RATE(CFS) =      68.59

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) =  1.70   FLOW VELOCITY(FEET/SEC.) =   7.94
     LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =   2663.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 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.) =   13.00
   RAINFALL INTENSITY(INCH/HR) =   2.64
   AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =      32.60
   TOTAL STREAM AREA(ACRES) =       32.60
   PEAK FLOW RATE(CFS) AT CONFLUENCE =       68.59

*****************************************************************************
   FLOW PROCESS FROM NODE  40410.00 TO NODE  40411.00 IS CODE =  21
-----------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=============================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
   ELEVATION DATA: UPSTREAM(FEET) =    878.00  DOWNSTREAM(FEET) =    726.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.371
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) =   3.476
   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
   "CHAPARRAL,BROADLEAF"      -         0.69      0.30     1.000     0    8.37
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =   0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      1.96
   TOTAL AREA(ACRES) =      0.69  PEAK FLOW RATE(CFS) =       1.96

*****************************************************************************
   FLOW PROCESS FROM NODE  40411.00 TO NODE  40412.00 IS CODE =  51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    726.00  DOWNSTREAM(FEET) =    687.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    101.00   CHANNEL SLOPE = 0.3861
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
```

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   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.410
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         0.91      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) =       3.23
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.30
   AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   0.23
   Tc(MIN.) =    8.60
   SUBAREA AREA(ACRES) =     0.91      SUBAREA RUNOFF(CFS) =    2.55
   EFFECTIVE AREA(ACRES) =      1.60      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       1.6       PEAK FLOW RATE(CFS) =       4.47

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   7.98
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40412.00 =    430.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40412.00 TO NODE  40413.00 IS CODE =  51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    687.00  DOWNSTREAM(FEET) =    658.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   153.00   CHANNEL SLOPE = 0.1895
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.297
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         0.96      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) =       5.76
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.47
   AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   0.39
   Tc(MIN.) =    9.00
   SUBAREA AREA(ACRES) =     0.96      SUBAREA RUNOFF(CFS) =    2.58
   EFFECTIVE AREA(ACRES) =      2.55      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) =       6.88

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   6.89
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40413.00 =    583.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40413.00 TO NODE  40414.00 IS CODE =  51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    658.00  DOWNSTREAM(FEET) =    615.00
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   CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE =  0.1741
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.135
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -         2.51      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) =     10.09
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.23
   AVERAGE FLOW DEPTH(FEET) =  0.68    TRAVEL TIME(MIN.) =   0.57
   Tc(MIN.) =    9.56
   SUBAREA AREA(ACRES) =     2.51       SUBAREA RUNOFF(CFS) =    6.40
   EFFECTIVE AREA(ACRES) =     5.06     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        5.1       PEAK FLOW RATE(CFS) =     12.91

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.74   FLOW VELOCITY(FEET/SEC.) =  7.76
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40414.00 =    830.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  40414.00 TO NODE  40415.00 IS CODE = 51
----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    567.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   414.00   CHANNEL SLOPE =  0.1159
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.946
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -         4.38      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) =     18.13
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.25
   AVERAGE FLOW DEPTH(FEET) =  0.91    TRAVEL TIME(MIN.) =   0.95
   Tc(MIN.) =   10.52
   SUBAREA AREA(ACRES) =     4.38       SUBAREA RUNOFF(CFS) =   10.43
   EFFECTIVE AREA(ACRES) =     9.44     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        9.4       PEAK FLOW RATE(CFS) =     22.48

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.99   FLOW VELOCITY(FEET/SEC.) =  7.66
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40415.00 =   1244.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  40415.00 TO NODE  40416.00 IS CODE = 51
----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
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=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    567.00  DOWNSTREAM(FEET) =    538.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   301.00   CHANNEL SLOPE =  0.0963
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.866
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -         7.77      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) =     31.45
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.76
   AVERAGE FLOW DEPTH(FEET) =  1.16    TRAVEL TIME(MIN.) =   0.65
   Tc(MIN.) =   11.16
   SUBAREA AREA(ACRES) =     7.77       SUBAREA RUNOFF(CFS) =   17.94
   EFFECTIVE AREA(ACRES) =    17.21     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) =     39.73

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.27   FLOW VELOCITY(FEET/SEC.) =  8.22
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40416.00 =   1545.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  40416.00 TO NODE  40417.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    538.00  DOWNSTREAM(FEET) =    529.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   116.00   CHANNEL SLOPE =  0.0776
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.837
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -        16.20      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) =     58.23
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.37
   AVERAGE FLOW DEPTH(FEET) =  1.52    TRAVEL TIME(MIN.) =   0.23
   Tc(MIN.) =   11.39
   SUBAREA AREA(ACRES) =    16.20       SUBAREA RUNOFF(CFS) =   37.00
   EFFECTIVE AREA(ACRES) =    33.41     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       33.4       PEAK FLOW RATE(CFS) =     76.29

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.69   FLOW VELOCITY(FEET/SEC.) =  8.92
   LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40417.00 =   1661.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  40417.00 TO NODE  40447.00 IS CODE = 51
-------------------------------------------------------------------------
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```
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    529.00  DOWNSTREAM(FEET) =    482.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   891.00    CHANNEL SLOPE = 0.0527
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.609
    SUBAREA LOSS RATE DATA(AMC II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -        14.55      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) =    91.41
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.07
    AVERAGE FLOW DEPTH(FEET) =   1.94    TRAVEL TIME(MIN.) =   1.84
    Tc(MIN.) =   13.23
    SUBAREA AREA(ACRES) =    14.55        SUBAREA RUNOFF(CFS) =   30.23
    EFFECTIVE AREA(ACRES) =    47.96      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =      48.0        PEAK FLOW RATE(CFS) =     99.67

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =   2.00   FLOW VELOCITY(FEET/SEC.) =   8.28
    LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40447.00 =    2552.00 FEET.

******************************************************************************
    FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 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.) =   13.23
    RAINFALL INTENSITY(INCH/HR) =    2.61
    AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30
    AREA-AVERAGED Ap =  1.00
    EFFECTIVE STREAM AREA(ACRES) =      47.96
    TOTAL STREAM AREA(ACRES) =      47.96
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      99.67

    ** CONFLUENCE DATA **
    STREAM      Q       Tc   Intensity  Fp(Fm)    Ap      Ae    HEADWATER
    NUMBER    (CFS)   (MIN.) (INCH/HR)  (INCH/HR)        (ACRES)   NODE
      1       68.59   13.00    2.638   0.30( 0.30) 1.00    32.6   40400.00
      2       99.67   13.23    2.609   0.30( 0.30) 1.00    48.0   40410.00

    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      167.74   13.00    2.638   0.30( 0.30) 1.00    79.7   40400.00
      2      167.42   13.23    2.609   0.30( 0.30) 1.00    80.6   40410.00
```

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    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      167.74     Tc(MIN.) =     13.00
    EFFECTIVE AREA(ACRES) =      79.72    AREA-AVERAGED Fm(INCH/HR) = 0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.00
    TOTAL AREA(ACRES) =      80.6
    LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

******************************************************************************
    FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE =  10
------------------------------------------------------------------------------
    >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==============================================================================

******************************************************************************
    FLOW PROCESS FROM NODE  40420.00 TO NODE  40421.00 IS CODE =  21
------------------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
    >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
    INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
    ELEVATION DATA: UPSTREAM(FEET) =    925.00  DOWNSTREAM(FEET) =    815.00

    Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
    SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     8.799
    * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.354
    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
    "CHAPARRAL,BROADLEAF"     -        0.31      0.30      1.000      0    8.80
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
    SUBAREA RUNOFF(CFS) =      0.85
    TOTAL AREA(ACRES) =       0.31   PEAK FLOW RATE(CFS) =      0.85

******************************************************************************
    FLOW PROCESS FROM NODE  40421.00 TO NODE  40422.00 IS CODE =  51
------------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    815.00  DOWNSTREAM(FEET) =    743.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   123.00    CHANNEL SLOPE = 0.5854
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.267
    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      -
    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) =     1.24
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.78
    AVERAGE FLOW DEPTH(FEET) =   0.25    TRAVEL TIME(MIN.) =   0.30
    Tc(MIN.) =    9.10
    SUBAREA AREA(ACRES) =     0.30        SUBAREA RUNOFF(CFS) =     0.79
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EFFECTIVE AREA(ACRES) =      0.60     AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =        0.6        PEAK FLOW RATE(CFS) =        1.61

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.27   FLOW VELOCITY(FEET/SEC.) =   7.28
LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40422.00 =     444.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40422.00 TO NODE  40423.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    743.00  DOWNSTREAM(FEET) =    665.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   142.00   CHANNEL SLOPE = 0.5493
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.183
  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      -
  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) =       2.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.07
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   0.29
  Tc(MIN.) =   9.39
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    2.08
  EFFECTIVE AREA(ACRES) =      1.40     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =        3.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   FLOW VELOCITY(FEET/SEC.) =   8.56
  LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40423.00 =     586.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40423.00 TO NODE  40424.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    665.00  DOWNSTREAM(FEET) =    630.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    99.00   CHANNEL SLOPE = 0.3535
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.121
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        0.32     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) =       4.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.57
  AVERAGE FLOW DEPTH(FEET) =   0.42   TRAVEL TIME(MIN.) =   0.22
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  Tc(MIN.) =   9.61
  SUBAREA AREA(ACRES) =     0.32       SUBAREA RUNOFF(CFS) =    0.81
  EFFECTIVE AREA(ACRES) =      1.72     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =        4.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   FLOW VELOCITY(FEET/SEC.) =   7.61
  LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40424.00 =     685.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40424.00 TO NODE  40425.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    615.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    35.00   CHANNEL SLOPE = 0.4286
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.103
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        1.87     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) =       6.73
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.23
  AVERAGE FLOW DEPTH(FEET) =   0.49   TRAVEL TIME(MIN.) =   0.06
  Tc(MIN.) =   9.68
  SUBAREA AREA(ACRES) =     1.87       SUBAREA RUNOFF(CFS) =    4.71
  EFFECTIVE AREA(ACRES) =      3.59     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) =        9.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.55   FLOW VELOCITY(FEET/SEC.) =   9.90
  LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40425.00 =     720.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  40425.00 TO NODE  40426.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    574.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   260.00   CHANNEL SLOPE = 0.1577
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.974
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        1.19     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) =      10.49
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    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.04
    AVERAGE FLOW DEPTH(FEET) =   0.70    TRAVEL TIME(MIN.) =   0.62
    Tc(MIN.) =   10.29
    SUBAREA AREA(ACRES) =      1.19       SUBAREA RUNOFF(CFS) =    2.86
    EFFECTIVE AREA(ACRES) =      4.78       AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =       4.8        PEAK FLOW RATE(CFS) =      11.51

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.73   FLOW VELOCITY(FEET/SEC.) =   7.24
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40426.00 =    980.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40426.00 TO NODE  40427.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =     533.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   322.00   CHANNEL SLOPE = 0.1273
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.879
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL     AREA        Fp        Ap      SCS
         LAND USE            GROUP      (ACRES)   (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -         1.82       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) =      13.62
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.99
    AVERAGE FLOW DEPTH(FEET) =   0.81    TRAVEL TIME(MIN.) =   0.77
    Tc(MIN.) =   11.06
    SUBAREA AREA(ACRES) =      1.82       SUBAREA RUNOFF(CFS) =    4.22
    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) =      15.32

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.84   FLOW VELOCITY(FEET/SEC.) =   7.20
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40427.00 =   1302.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40427.00 TO NODE  40428.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    533.00  DOWNSTREAM(FEET) =     521.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE = 0.0750
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.828
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL     AREA        Fp        Ap      SCS
         LAND USE            GROUP      (ACRES)   (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -         6.79       0.30      1.000      -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
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    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      23.04
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.51
    AVERAGE FLOW DEPTH(FEET) =   1.09    TRAVEL TIME(MIN.) =   0.41
    Tc(MIN.) =   11.47
    SUBAREA AREA(ACRES) =      6.79       SUBAREA RUNOFF(CFS) =   15.45
    EFFECTIVE AREA(ACRES) =     13.39       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) =      30.46

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.20   FLOW VELOCITY(FEET/SEC.) =   7.02
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40428.00 =   1462.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40428.00 TO NODE  40429.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    521.00  DOWNSTREAM(FEET) =     508.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   221.00   CHANNEL SLOPE = 0.0588
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.759
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL     AREA        Fp        Ap      SCS
         LAND USE            GROUP      (ACRES)   (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -         3.74       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) =      34.60
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.59
    AVERAGE FLOW DEPTH(FEET) =   1.32    TRAVEL TIME(MIN.) =   0.56
    Tc(MIN.) =   12.03
    SUBAREA AREA(ACRES) =      3.74       SUBAREA RUNOFF(CFS) =    8.28
    EFFECTIVE AREA(ACRES) =     17.13       AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =      17.1        PEAK FLOW RATE(CFS) =      37.91

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.37   FLOW VELOCITY(FEET/SEC.) =   6.75
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40429.00 =   1683.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40429.00 TO NODE  40446.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    508.00  DOWNSTREAM(FEET) =     489.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   306.00   CHANNEL SLOPE = 0.0621
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.667
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL     AREA        Fp        Ap      SCS
         LAND USE            GROUP      (ACRES)   (INCH/HR)  (DECIMAL)  CN
```

```
   USER-DEFINED              -        0.99      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) =      38.96
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.93
   AVERAGE FLOW DEPTH(FEET) =  1.37   TRAVEL TIME(MIN.) =   0.74
   Tc(MIN.) =  12.76
   SUBAREA AREA(ACRES) =      0.99      SUBAREA RUNOFF(CFS) =    2.11
   EFFECTIVE AREA(ACRES) =     18.12     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      18.1       PEAK FLOW RATE(CFS) =      38.61

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.36   FLOW VELOCITY(FEET/SEC.) =  6.93
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =   1989.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE = 10
--------------------------------------------------------------------------
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==========================================================================

****************************************************************************
   FLOW PROCESS FROM NODE  40430.00 TO NODE  40431.00 IS CODE = 21
--------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  302.00
   ELEVATION DATA: UPSTREAM(FEET) =  1035.00  DOWNSTREAM(FEET) =    875.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     7.870
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.619
   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
   "CHAPARRAL,BROADLEAF"      -        0.40      0.30      1.000       0    7.87
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       1.21
   TOTAL AREA(ACRES) =       0.40   PEAK FLOW RATE(CFS) =       1.21

****************************************************************************
   FLOW PROCESS FROM NODE  40431.00 TO NODE  40432.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    875.00  DOWNSTREAM(FEET) =    800.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  160.00   CHANNEL SLOPE = 0.4688
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 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
```

```
   USER-DEFINED              -        0.65      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) =       2.14
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.17
   AVERAGE FLOW DEPTH(FEET) =  0.32   TRAVEL TIME(MIN.) =   0.37
   Tc(MIN.) =   8.24
   SUBAREA AREA(ACRES) =      0.65      SUBAREA RUNOFF(CFS) =    1.87
   EFFECTIVE AREA(ACRES) =      1.05     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) =       3.04

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.36   FLOW VELOCITY(FEET/SEC.) =  7.76
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40432.00 =    462.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40432.00 TO NODE  40433.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    712.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  150.00   CHANNEL SLOPE = 0.5867
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.437
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA        Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -        1.08      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) =       4.57
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.45
   AVERAGE FLOW DEPTH(FEET) =  0.40   TRAVEL TIME(MIN.) =   0.26
   Tc(MIN.) =   8.51
   SUBAREA AREA(ACRES) =      1.08      SUBAREA RUNOFF(CFS) =    3.05
   EFFECTIVE AREA(ACRES) =      2.13     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       2.1       PEAK FLOW RATE(CFS) =       6.03

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.45   FLOW VELOCITY(FEET/SEC.) = 10.13
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40433.00 =    612.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40433.00 TO NODE  40434.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    712.00  DOWNSTREAM(FEET) =    657.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  120.00   CHANNEL SLOPE = 0.4583
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.381
   SUBAREA LOSS RATE DATA(AMC II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
    LAND USE            GROUP    (ACRES)   (INCH/HR) (DECIMAL)   CN
 USER-DEFINED            -        1.98      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) =      8.77
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.14
 AVERAGE FLOW DEPTH(FEET) = 0.54   TRAVEL TIME(MIN.) =  0.20
 Tc(MIN.) =   8.70
 SUBAREA AREA(ACRES) =    1.98      SUBAREA RUNOFF(CFS) =    5.49
 EFFECTIVE AREA(ACRES) =     4.11    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       4.1      PEAK FLOW RATE(CFS) =     11.41

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.59   FLOW VELOCITY(FEET/SEC.) = 10.84
 LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40434.00 =    732.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40434.00 TO NODE  40435.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    657.00 DOWNSTREAM(FEET) =    620.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   161.00  CHANNEL SLOPE = 0.2298
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.293
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)   (INCH/HR) (DECIMAL)   CN
  USER-DEFINED            -        2.34      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) =     14.56
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.80
  AVERAGE FLOW DEPTH(FEET) = 0.74   TRAVEL TIME(MIN.) =  0.31
  Tc(MIN.) =   9.01
  SUBAREA AREA(ACRES) =    2.34      SUBAREA RUNOFF(CFS) =    6.31
  EFFECTIVE AREA(ACRES) =     6.46    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) =     17.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.79   FLOW VELOCITY(FEET/SEC.) = 9.28
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40435.00 =    893.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40435.00 TO NODE  40445.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    620.00 DOWNSTREAM(FEET) =    579.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   358.00  CHANNEL SLOPE = 0.1145
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
```

```
 *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.061
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)   (INCH/HR) (DECIMAL)   CN
  USER-DEFINED            -        1.75      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) =     19.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.33
  AVERAGE FLOW DEPTH(FEET) = 0.94   TRAVEL TIME(MIN.) =  0.81
  Tc(MIN.) =   9.82
  SUBAREA AREA(ACRES) =    1.75      SUBAREA RUNOFF(CFS) =    4.36
  EFFECTIVE AREA(ACRES) =     8.21    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       8.2      PEAK FLOW RATE(CFS) =     20.40

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.96   FLOW VELOCITY(FEET/SEC.) = 7.43
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40445.00 =   1251.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40445.00 TO NODE  40445.00 IS CODE =  1
---------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
===========================================================================
  TOTAL NUMBER OF STREAMS = 2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.82
  RAINFALL INTENSITY(INCH/HR) =   3.06
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap = 1.00
  EFFECTIVE STREAM AREA(ACRES) =       8.21
  TOTAL STREAM AREA(ACRES) =        8.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.40

*****************************************************************************
  FLOW PROCESS FROM NODE  40440.00 TO NODE  40441.00 IS CODE = 21
---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  319.00
  ELEVATION DATA: UPSTREAM(FEET) =   1020.00 DOWNSTREAM(FEET) =   898.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   8.586
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.414
  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
  "CHAPARRAL,BROADLEAF"   -        0.75      0.30      1.000     0   8.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      2.10
  TOTAL AREA(ACRES) =       0.75   PEAK FLOW RATE(CFS) =      2.10
```

```
********************************************************************
   FLOW PROCESS FROM NODE  40441.00 TO NODE  40442.00 IS CODE =  51
-------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    898.00  DOWNSTREAM(FEET) =    760.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   253.00   CHANNEL SLOPE =  0.5455
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.271
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         0.89      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) =       3.29
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.39
   AVERAGE FLOW DEPTH(FEET) =   0.36    TRAVEL TIME(MIN.) =   0.50
   Tc(MIN.) =   9.09
   SUBAREA AREA(ACRES) =     0.89      SUBAREA RUNOFF(CFS) =    2.37
   EFFECTIVE AREA(ACRES) =      1.64     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        1.6          PEAK FLOW RATE(CFS) =       4.38

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =  9.06
   LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40442.00 =      572.00 FEET.

********************************************************************
   FLOW PROCESS FROM NODE  40442.00 TO NODE  40443.00 IS CODE =  51
-------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    760.00  DOWNSTREAM(FEET) =    653.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   188.00   CHANNEL SLOPE =  0.5691
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.183
   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) =       6.72
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.22
   AVERAGE FLOW DEPTH(FEET) =   0.47    TRAVEL TIME(MIN.) =   0.31
   Tc(MIN.) =   9.40
   SUBAREA AREA(ACRES) =     1.80      SUBAREA RUNOFF(CFS) =    4.68
   EFFECTIVE AREA(ACRES) =      3.44     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        3.4          PEAK FLOW RATE(CFS) =       8.93

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) = 10.94
```

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   LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40443.00 =      760.00 FEET.

********************************************************************
   FLOW PROCESS FROM NODE  40443.00 TO NODE  40444.00 IS CODE =  51
-------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    653.00  DOWNSTREAM(FEET) =    605.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   198.00   CHANNEL SLOPE =  0.2424
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  3.075
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         3.16      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) =      12.87
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.78
   AVERAGE FLOW DEPTH(FEET) =   0.70    TRAVEL TIME(MIN.) =   0.38
   Tc(MIN.) =   9.77
   SUBAREA AREA(ACRES) =     3.16      SUBAREA RUNOFF(CFS) =    7.89
   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) =      16.48

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.77   FLOW VELOCITY(FEET/SEC.) =  9.32
   LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40444.00 =      958.00 FEET.

********************************************************************
   FLOW PROCESS FROM NODE  40444.00 TO NODE  40445.00 IS CODE =  51
-------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    579.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   243.00   CHANNEL SLOPE =  0.1070
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.967
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         1.67      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) =      18.49
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.07
   AVERAGE FLOW DEPTH(FEET) =   0.93    TRAVEL TIME(MIN.) =   0.57
   Tc(MIN.) =  10.34
   SUBAREA AREA(ACRES) =     1.67      SUBAREA RUNOFF(CFS) =    4.02
   EFFECTIVE AREA(ACRES) =      8.27     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        8.3          PEAK FLOW RATE(CFS) =      19.86
```

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   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.96   FLOW VELOCITY(FEET/SEC.) =   7.21
   LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40445.00 =    1201.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40445.00 TO NODE  40445.00 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.) =   10.34
   RAINFALL INTENSITY(INCH/HR) =   2.97
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =       8.27
   TOTAL STREAM AREA(ACRES) =       8.27
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.86

   ** CONFLUENCE DATA **
   STREAM    Q      Tc   Intensity  Fp(Fm)    Ap     Ae     HEADWATER
   NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)   NODE
     1      20.40   9.82   3.061   0.30( 0.30) 1.00    8.2   40430.00
     2      19.86  10.34   2.967   0.30( 0.30) 1.00    8.3   40440.00

   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      39.92   9.82   3.061   0.30( 0.30) 1.00   16.1   40430.00
     2      39.57  10.34   2.967   0.30( 0.30) 1.00   16.5   40440.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =       39.92   Tc(MIN.) =     9.82
   EFFECTIVE AREA(ACRES) =      16.07   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      16.5
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40445.00 =    1251.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40445.00 TO NODE  40446.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    579.00  DOWNSTREAM(FEET) =    489.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   636.00   CHANNEL SLOPE = 0.1415
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.897
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp       Ap     SCS
      LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
    USER-DEFINED            -       3.79     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) =      44.35
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.75
   AVERAGE FLOW DEPTH(FEET) =   1.23   TRAVEL TIME(MIN.) =  1.09
   Tc(MIN.) =   10.91
   SUBAREA AREA(ACRES) =      3.79      SUBAREA RUNOFF(CFS) =    8.85
   EFFECTIVE AREA(ACRES) =      19.85     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       20.3        PEAK FLOW RATE(CFS) =      46.41

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.25   FLOW VELOCITY(FEET/SEC.) =  9.84
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40446.00 =   1887.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE =  11
-------------------------------------------------------------------------------
   >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
===============================================================================

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM    Q      Tc   Intensity  Fp(Fm)    Ap     Ae     HEADWATER
   NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)   NODE
     1      46.41  10.91   2.897   0.30( 0.30) 1.00   19.9   40430.00
     2      46.20  11.43   2.832   0.30( 0.30) 1.00   20.3   40440.00
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40446.00 =   1887.00 FEET.

   ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM    Q      Tc   Intensity  Fp(Fm)    Ap     Ae     HEADWATER
   NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)   NODE
     1      38.61  12.76   2.667   0.30( 0.30) 1.00   18.1   40420.00
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =   1989.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM    Q      Tc   Intensity  Fp(Fm)    Ap     Ae     HEADWATER
   NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)   NODE
     1      82.61  10.91   2.897   0.30( 0.30) 1.00   35.3   40430.00
     2      83.19  11.43   2.832   0.30( 0.30) 1.00   36.5   40440.00
     3      81.80  12.76   2.667   0.30( 0.30) 1.00   38.4   40420.00
    TOTAL AREA(ACRES) =       38.4

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =       83.19  Tc(MIN.) =  11.432
   EFFECTIVE AREA(ACRES) =      36.50  AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      38.4
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =   1989.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE =  12
-------------------------------------------------------------------------------
   >>>>>CLEAR MEMORY BANK # 2 <<<<<
===============================================================================

*************************************************************************
   FLOW PROCESS FROM NODE  40446.00 TO NODE  40447.00 IS CODE =  51
-------------------------------------------------------------------------------
```

```
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    489.00  DOWNSTREAM(FEET) =    482.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    167.00   CHANNEL SLOPE = 0.0419
   CHANNEL BASE(FEET) =    0.00  "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.785
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        0.59     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) =     83.85
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.25
   AVERAGE FLOW DEPTH(FEET) =  1.96    TRAVEL TIME(MIN.) =   0.38
   Tc(MIN.) =   11.82
   SUBAREA AREA(ACRES) =      0.59       SUBAREA RUNOFF(CFS) =    1.32
   EFFECTIVE AREA(ACRES) =     37.09     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      39.0         PEAK FLOW RATE(CFS) =      83.19
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.96   FLOW VELOCITY(FEET/SEC.) =  7.23
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40447.00 =    2156.00 FEET.
***************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE =  11
---------------------------------------------------------------------------
   >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
===========================================================================

   ** MAIN STREAM CONFLUENCE DATA **
   STREAM      Q      Tc     Intensity  Fp(Fm)      Ap     Ae     HEADWATER
   NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
     1       82.61   11.29    2.850   0.30( 0.30) 1.00    35.9   40430.00
     2       83.19   11.82    2.785   0.30( 0.30) 1.00    37.1   40440.00
     3       81.80   13.15    2.620   0.30( 0.30) 1.00    39.0   40420.00
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40447.00 =    2156.00 FEET.

   ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM      Q      Tc     Intensity  Fp(Fm)      Ap     Ae     HEADWATER
   NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
     1      167.74   13.00    2.638   0.30( 0.30) 1.00    79.7   40400.00
     2      167.42   13.23    2.609   0.30( 0.30) 1.00    80.6   40410.00
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc     Intensity  Fp(Fm)      Ap     Ae     HEADWATER
   NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
     1      241.51   11.29    2.850   0.30( 0.30) 1.00   105.2   40430.00
     2      245.22   11.82    2.785   0.30( 0.30) 1.00   109.5   40440.00
     3      249.69   13.00    2.638   0.30( 0.30) 1.00   118.5   40400.00
     4      249.33   13.15    2.620   0.30( 0.30) 1.00   119.2   40420.00
     5      248.85   13.23    2.609   0.30( 0.30) 1.00   119.5   40410.00
   TOTAL AREA(ACRES) =      119.5
```

```
   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      249.69  Tc(MIN.) =   13.002
   EFFECTIVE AREA(ACRES) =    118.49  AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      119.5
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE =  12
---------------------------------------------------------------------------
   >>>>>CLEAR MEMORY BANK # 1 <<<<<
===========================================================================

***************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40448.00 IS CODE =  51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    482.00  DOWNSTREAM(FEET) =    447.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    926.00   CHANNEL SLOPE = 0.0378
   CHANNEL BASE(FEET) =    0.00  "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.434
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -       24.32     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) =    273.04
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.38
   AVERAGE FLOW DEPTH(FEET) =  3.12    TRAVEL TIME(MIN.) =   1.65
   Tc(MIN.) =   14.65
   SUBAREA AREA(ACRES) =     24.32       SUBAREA RUNOFF(CFS) =   46.70
   EFFECTIVE AREA(ACRES) =    142.81     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      143.9         PEAK FLOW RATE(CFS) =     274.25

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.12   FLOW VELOCITY(FEET/SEC.) =  9.37
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40448.00 =    3589.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc     Intensity  Fp(Fm)      Ap     Ae     HEADWATER
   NUMBER    (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)         (ACRES)    NODE
     1      273.20   12.95    2.644   0.30( 0.30) 1.00   129.5   40430.00
     2      274.72   13.47    2.580   0.30( 0.30) 1.00   133.9   40440.00
     3      274.25   14.65    2.434   0.30( 0.30) 1.00   142.8   40400.00
     4      273.27   14.80    2.415   0.30( 0.30) 1.00   143.5   40420.00
     5      272.53   14.88    2.405   0.30( 0.30) 1.00   143.9   40410.00
   NEW PEAK FLOW DATA ARE:
   PEAK FLOW RATE(CFS) =      274.72  Tc(MIN.) =   13.47
   AREA-AVERAGED Fm(INCH/HR) =  0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =      133.86

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   FLOW PROCESS FROM NODE  40448.00 TO NODE  40449.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =     433.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    443.00   CHANNEL SLOPE = 0.0316
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.484
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -        108.49     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) =     381.38
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.53
   AVERAGE FLOW DEPTH(FEET) =   3.65    TRAVEL TIME(MIN.) =   0.77
   Tc(MIN.) =   14.24
   SUBAREA AREA(ACRES) =  108.49       SUBAREA RUNOFF(CFS) = 213.28
   EFFECTIVE AREA(ACRES) =   242.35      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     252.3        PEAK FLOW RATE(CFS) =    476.43

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  3.97   FLOW VELOCITY(FEET/SEC.) = 10.08
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40449.00 =   4032.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM      Q       Tc    Intensity  Fp(Fm)     Ap      Ae    HEADWATER
   NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
      1     481.51   13.73    2.548   0.30( 0.30) 1.00    238.0   40430.00
      2     476.43   14.24    2.484   0.30( 0.30) 1.00    242.3   40440.00
      3     465.77   15.43    2.359   0.30( 0.30) 1.00    251.3   40400.00
      4     464.70   15.58    2.349   0.30( 0.30) 1.00    252.0   40420.00
      5     463.90   15.66    2.343   0.30( 0.30) 1.00    252.3   40410.00
   NEW PEAK FLOW DATA ARE:
   PEAK FLOW RATE(CFS) =     481.51  Tc(MIN.) =   13.73
   AREA-AVERAGED Fm(INCH/HR) =  0.30 AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00 EFFECTIVE AREA(ACRES) =     237.99

*****************************************************************************
   FLOW PROCESS FROM NODE  40449.00 TO NODE  40450.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    433.00  DOWNSTREAM(FEET) =     398.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   1065.00   CHANNEL SLOPE = 0.0329
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.359
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -         36.85     0.30     1.000     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
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   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     515.66
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.42
   AVERAGE FLOW DEPTH(FEET) =   4.06    TRAVEL TIME(MIN.) =   1.70
   Tc(MIN.) =   15.43
   SUBAREA AREA(ACRES) =   36.85       SUBAREA RUNOFF(CFS) = 68.29
   EFFECTIVE AREA(ACRES) =   274.83      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     289.2        PEAK FLOW RATE(CFS) =    509.33

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  4.04   FLOW VELOCITY(FEET/SEC.) = 10.40
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40450.00 =   5097.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM      Q       Tc    Intensity  Fp(Fm)     Ap      Ae    HEADWATER
   NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
      1     509.33   15.43    2.359   0.30( 0.30) 1.00    274.8   40430.00
      2     508.09   15.94    2.322   0.30( 0.30) 1.00    279.2   40440.00
      3     501.98   17.14    2.236   0.30( 0.30) 1.00    288.1   40400.00
      4     500.48   17.29    2.225   0.30( 0.30) 1.00    288.9   40420.00
      5     499.42   17.38    2.219   0.30( 0.30) 1.00    289.2   40410.00
   NEW PEAK FLOW DATA ARE:
   PEAK FLOW RATE(CFS) =     509.33  Tc(MIN.) =   15.43
   AREA-AVERAGED Fm(INCH/HR) =  0.30 AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =     274.83

*****************************************************************************
   FLOW PROCESS FROM NODE  40450.00 TO NODE  40451.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    398.00  DOWNSTREAM(FEET) =     386.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    401.00   CHANNEL SLOPE = 0.0299
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.313
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap      SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -         71.80     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) =     574.36
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.35
   AVERAGE FLOW DEPTH(FEET) =   4.30    TRAVEL TIME(MIN.) =   0.65
   Tc(MIN.) =   16.07
   SUBAREA AREA(ACRES) =   71.80       SUBAREA RUNOFF(CFS) = 130.06
   EFFECTIVE AREA(ACRES) =   346.63      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     361.0        PEAK FLOW RATE(CFS) =    627.90

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  4.45   FLOW VELOCITY(FEET/SEC.) = 10.57
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40451.00 =   5498.00 FEET.

   ** PEAK FLOW RATE TABLE **
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```
   STREAM      Q       Tc   Intensity  Fp(Fm)     Ap      Ae    HEADWATER
   NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
      1      627.90   16.07   2.313   0.30( 0.30) 1.00    346.6   40430.00
      2      624.03   16.59   2.275   0.30( 0.30) 1.00    351.0   40440.00
      3      611.93   17.79   2.189   0.30( 0.30) 1.00    359.9   40400.00
      4      609.66   17.94   2.178   0.30( 0.30) 1.00    360.7   40420.00
      5      608.20   18.03   2.172   0.30( 0.30) 1.00    361.0   40410.00
   NEW PEAK FLOW DATA ARE:
   PEAK FLOW RATE(CFS) =     627.90  Tc(MIN.) =   16.07
   AREA-AVERAGED Fm(INCH/HR) = 0.30  AREA-AVERAGED Fp(INCH/HR) = 0.30
   AREA-AVERAGED Ap = 1.00  EFFECTIVE AREA(ACRES) =     346.63

*****************************************************************************
   FLOW PROCESS FROM NODE  40451.00 TO NODE  40452.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     386.00  DOWNSTREAM(FEET) =     358.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    957.00   CHANNEL SLOPE = 0.0293
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.225
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)    CN
   USER-DEFINED            -         12.07     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) =     638.35
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 13.08
   AVERAGE FLOW DEPTH(FEET) =  4.03    TRAVEL TIME(MIN.) =  1.22
   Tc(MIN.) =   17.29
   SUBAREA AREA(ACRES) =    12.07       SUBAREA RUNOFF(CFS) =   20.91
   EFFECTIVE AREA(ACRES) =    358.71    AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =     373.1       PEAK FLOW RATE(CFS) =    627.90
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  4.01   FLOW VELOCITY(FEET/SEC.) = 13.01
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40452.00 =    6455.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM      Q       Tc   Intensity  Fp(Fm)     Ap      Ae    HEADWATER
   NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
      1      627.90   17.29   2.225   0.30( 0.30) 1.00    358.7   40430.00
      2      624.03   17.81   2.187   0.30( 0.30) 1.00    363.1   40440.00
      3      611.93   19.02   2.100   0.30( 0.30) 1.00    372.0   40400.00
      4      609.66   19.18   2.089   0.30( 0.30) 1.00    372.8   40420.00
      5      608.20   19.26   2.083   0.30( 0.30) 1.00    373.1   40410.00
   NEW PEAK FLOW DATA ARE:
   PEAK FLOW RATE(CFS) =     627.90  Tc(MIN.) =   17.29
   AREA-AVERAGED Fm(INCH/HR) = 0.30  AREA-AVERAGED Fp(INCH/HR) = 0.30
   AREA-AVERAGED Ap = 1.00  EFFECTIVE AREA(ACRES) =     358.71

*****************************************************************************
   FLOW PROCESS FROM NODE  40452.00 TO NODE  40453.00 IS CODE = 51
```
```
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     358.00  DOWNSTREAM(FEET) =     341.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   429.00   CHANNEL SLOPE = 0.0396
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.190
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)    CN
   USER-DEFINED            -          0.27     0.30      0.500      -
   USER-DEFINED            -          1.96     0.30      1.000      -
   USER-DEFINED            -          0.96     0.30      1.000      -
   USER-DEFINED            -          0.38     0.30      1.000      -
   USER-DEFINED            -          0.18     0.30      1.000      -
   USER-DEFINED            -          1.69     0.30      1.000      -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.975
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     632.54
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 14.58
   AVERAGE FLOW DEPTH(FEET) =  3.80    TRAVEL TIME(MIN.) =  0.49
   Tc(MIN.) =   17.78
   SUBAREA AREA(ACRES) =     5.44       SUBAREA RUNOFF(CFS) =    9.29
   EFFECTIVE AREA(ACRES) =    364.15    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =     378.5       PEAK FLOW RATE(CFS) =    627.90
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  3.79   FLOW VELOCITY(FEET/SEC.) = 14.58
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40453.00 =    6884.00 FEET.

   ** PEAK FLOW RATE TABLE **
   STREAM      Q       Tc   Intensity  Fp(Fm)     Ap      Ae    HEADWATER
   NUMBER    (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
      1      627.90   17.78   2.190   0.30( 0.30) 1.00    364.1   40430.00
      2      624.03   18.30   2.152   0.30( 0.30) 1.00    368.5   40440.00
      3      611.93   19.51   2.065   0.30( 0.30) 1.00    377.5   40400.00
      4      609.66   19.67   2.054   0.30( 0.30) 1.00    378.2   40420.00
      5      608.20   19.75   2.048   0.30( 0.30) 1.00    378.5   40410.00
   NEW PEAK FLOW DATA ARE:
   PEAK FLOW RATE(CFS) =     627.90  Tc(MIN.) =   17.78
   AREA-AVERAGED Fm(INCH/HR) = 0.30  AREA-AVERAGED Fp(INCH/HR) = 0.30
   AREA-AVERAGED Ap = 1.00  EFFECTIVE AREA(ACRES) =     364.15

*****************************************************************************
   FLOW PROCESS FROM NODE  40453.00 TO NODE  40453.00 IS CODE = 81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   MAINLINE Tc(MIN.) =   17.78
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.190
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)    CN
   USER-DEFINED            -          0.18     0.30      1.000      -
```

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USER-DEFINED              -      5.30     0.30      0.850      -
USER-DEFINED              -      0.64     0.30      1.000      -
USER-DEFINED              -      2.08     0.30      1.000      -
USER-DEFINED              -      0.67     0.30      0.100      -
USER-DEFINED              -      0.29     0.30      1.000      -
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.847
SUBAREA AREA(ACRES) =     9.16     SUBAREA RUNOFF(CFS) =   15.96
EFFECTIVE AREA(ACRES) =     373.31    AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =     387.7     PEAK FLOW RATE(CFS) =     635.27

**************************************************************************
  FLOW PROCESS FROM NODE  40453.00 TO NODE  40450.00 IS CODE = 81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   17.78
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.190
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -      0.03     0.30      1.000      -
  USER-DEFINED              -      4.59     0.30      0.850      -
  USER-DEFINED              -      0.01     0.30      1.000      -
  USER-DEFINED              -      0.51     0.30      1.000      -
  USER-DEFINED              -      0.73     0.30      1.000      -
  USER-DEFINED              -      0.16     0.30      1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.886
  SUBAREA AREA(ACRES) =     6.03     SUBAREA RUNOFF(CFS) =   10.44
  EFFECTIVE AREA(ACRES) =     379.34    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =     393.7     PEAK FLOW RATE(CFS) =     645.71

**************************************************************************
  FLOW PROCESS FROM NODE  40453.00 TO NODE  40453.00 IS CODE = 81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   17.78
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.190
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -      0.37     0.30      1.000      -
  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) =     0.87     SUBAREA RUNOFF(CFS) =    1.48
  EFFECTIVE AREA(ACRES) =     380.21    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =     394.6     PEAK FLOW RATE(CFS) =     647.19
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      394.6  TC(MIN.) =     17.78
  EFFECTIVE AREA(ACRES) =    380.21  AREA-AVERAGED Fm(INCH/HR)=  0.30
```

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AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.994
PEAK FLOW RATE(CFS)   =      647.19

** PEAK FLOW RATE TABLE **
STREAM     Q       Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
NUMBER   (CFS)   (MIN.) (INCH/HR)  (INCH/HR)           (ACRES)   NODE
   1     647.19   17.78    2.190   0.30( 0.30) 0.99     380.2   40430.00
   2     641.64   18.30    2.152   0.30( 0.30) 0.99     384.6   40440.00
   3     625.70   19.51    2.065   0.30( 0.30) 0.99     393.5   40400.00
   4     622.93   19.67    2.054   0.30( 0.30) 0.99     394.3   40420.00
   5     621.24   19.75    2.048   0.30( 0.30) 0.99     394.6   40410.00
==========================================================================
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
********************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                     Michael Baker International
                     5 Hutton Centre Drive Suite 500
                         Santa Ana, CA92707


 ************************** DESCRIPTION OF STUDY ************************
 * RMV PA-4 WATERSHED 5 EXISTING CONDITION                            *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 50-YR EV MARCH 2019 CCHIU                                          *
 **********************************************************************

  FILE NAME: X40550EV.DAT
  TIME/DATE OF STUDY: 09:21 03/25/2019
================================================================================
   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; 0.170
  *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  60.0     30.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  2  50.0     25.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  3  40.0     20.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  4  30.0     15.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  5  20.0     10.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
```

```
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = 0.00 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  40500.00 TO NODE  40501.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   328.00
  ELEVATION DATA: UPSTREAM(FEET) =   961.00  DOWNSTREAM(FEET) =   845.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.819
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.348
  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
  "CHAPARRAL,BROADLEAF"      -       0.63     0.30      1.000     0   8.82
  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) =       0.63   PEAK FLOW RATE(CFS) =      1.73


********************************************************************************
  FLOW PROCESS FROM NODE  40501.00 TO NODE  40502.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   845.00  DOWNSTREAM(FEET) =   788.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  141.00   CHANNEL SLOPE = 0.4043
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  *  15 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               -       1.11     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) =      3.21
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.53
  AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   0.31
  Tc(MIN.) =    9.13
  SUBAREA AREA(ACRES) =    1.11        SUBAREA RUNOFF(CFS) =    2.96
  EFFECTIVE AREA(ACRES) =      1.74      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.7          PEAK FLOW RATE(CFS) =       4.64

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

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       Date: 04/20/2019   File name: X40550EV.RES   Page 2

```
       DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   8.28
       LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40502.00 =    469.00 FEET.


 *****************************************************************************
   FLOW PROCESS FROM NODE  40502.00 TO NODE  40503.00 IS CODE = 51
 ---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    788.00  DOWNSTREAM(FEET) =    719.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   187.00   CHANNEL SLOPE = 0.3690
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.155
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        1.44      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) =      6.49
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.62
   AVERAGE FLOW DEPTH(FEET) =   0.50    TRAVEL TIME(MIN.) =   0.36
   Tc(MIN.) =    9.49
   SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    3.70
   EFFECTIVE AREA(ACRES) =    3.18     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) =     8.17

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   9.19
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40503.00 =    656.00 FEET.


 *****************************************************************************
   FLOW PROCESS FROM NODE  40503.00 TO NODE  40504.00 IS CODE = 51
 ---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    719.00  DOWNSTREAM(FEET) =    545.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   302.00   CHANNEL SLOPE = 0.5762
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.035
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        3.36      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) =     12.31
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 12.00
   AVERAGE FLOW DEPTH(FEET) =   0.58    TRAVEL TIME(MIN.) =   0.42
   Tc(MIN.) =    9.91
   SUBAREA AREA(ACRES) =    3.36      SUBAREA RUNOFF(CFS) =    8.27
   EFFECTIVE AREA(ACRES) =    6.54     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) =    16.10
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.65   FLOW VELOCITY(FEET/SEC.) =  12.87
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40504.00 =    958.00 FEET.

 *****************************************************************************
   FLOW PROCESS FROM NODE  40504.00 TO NODE  40505.00 IS CODE = 51
 ---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    470.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   328.00   CHANNEL SLOPE = 0.2287
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.956
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        9.58      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) =     27.55
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.36
   AVERAGE FLOW DEPTH(FEET) =   0.94    TRAVEL TIME(MIN.) =   0.53
   Tc(MIN.) =   10.44
   SUBAREA AREA(ACRES) =    9.58      SUBAREA RUNOFF(CFS) =   22.90
   EFFECTIVE AREA(ACRES) =   16.12     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =     16.1        PEAK FLOW RATE(CFS) =    38.53

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.07   FLOW VELOCITY(FEET/SEC.) =  11.32
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40505.00 =   1286.00 FEET.

 *****************************************************************************
   FLOW PROCESS FROM NODE  40505.00 TO NODE  40506.00 IS CODE = 51
 ---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   507.00   CHANNEL SLOPE = 0.1183
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 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              -       10.98      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) =     51.11
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.49
   AVERAGE FLOW DEPTH(FEET) =   1.34    TRAVEL TIME(MIN.) =   0.89
   Tc(MIN.) =   11.33
   SUBAREA AREA(ACRES) =   10.98      SUBAREA RUNOFF(CFS) =   25.16
   EFFECTIVE AREA(ACRES) =   27.10     AREA-AVERAGED Fm(INCH/HR) =   0.30
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AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =       27.1       PEAK FLOW RATE(CFS) =       62.09

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.44   FLOW VELOCITY(FEET/SEC.) =   9.91
LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40506.00 =    1793.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40506.00 TO NODE  40507.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    355.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    698.00   CHANNEL SLOPE = 0.0788
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.679
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        4.53      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) =      66.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.66
  AVERAGE FLOW DEPTH(FEET) =   1.61   TRAVEL TIME(MIN.) =   1.34
  Tc(MIN.) =   12.67
  SUBAREA AREA(ACRES) =     4.53       SUBAREA RUNOFF(CFS) =    9.70
  EFFECTIVE AREA(ACRES) =     31.63     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       31.6       PEAK FLOW RATE(CFS) =       67.72

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.61   FLOW VELOCITY(FEET/SEC.) =   8.74
  LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40507.00 =    2491.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40507.00 TO NODE  40518.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    341.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    604.00   CHANNEL SLOPE = 0.0232
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.501
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        9.02      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) =      76.66
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.05
  AVERAGE FLOW DEPTH(FEET) =   1.90   TRAVEL TIME(MIN.) =   1.43
  Tc(MIN.) =   14.10
```

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  SUBAREA AREA(ACRES) =     9.02       SUBAREA RUNOFF(CFS) =   17.88
  EFFECTIVE AREA(ACRES) =     40.66     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       40.7       PEAK FLOW RATE(CFS) =       80.56

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.94   FLOW VELOCITY(FEET/SEC.) =   7.13
  LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40518.00 =    3095.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40518.00 TO NODE  40518.00 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.) =   14.10
  RAINFALL INTENSITY(INCH/HR) =   2.50
  AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30
  AREA-AVERAGED Ap = 1.00
  EFFECTIVE STREAM AREA(ACRES) =      40.66
  TOTAL STREAM AREA(ACRES) =      40.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       80.56

*****************************************************************************
  FLOW PROCESS FROM NODE  40510.00 TO NODE  40511.00 IS CODE = 21
---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
  ELEVATION DATA: UPSTREAM(FEET) =    851.00  DOWNSTREAM(FEET) =    735.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.835
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.343
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS    Tc
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN   (MIN.)
  NATURAL FAIR COVER
  "CHAPARRAL,BROADLEAF"     -        0.48      0.30     1.000      0    8.84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =     1.31
  TOTAL AREA(ACRES) =        0.48  PEAK FLOW RATE(CFS) =        1.31

*****************************************************************************
  FLOW PROCESS FROM NODE  40511.00 TO NODE  40512.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    735.00  DOWNSTREAM(FEET) =    650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    116.00   CHANNEL SLOPE = 0.7328
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.280
```

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  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap        SCS
        LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)    CN
   USER-DEFINED              -        0.73      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) =      2.28
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.74
   AVERAGE FLOW DEPTH(FEET) =  0.29    TRAVEL TIME(MIN.) =   0.22
   Tc(MIN.) =   9.06
   SUBAREA AREA(ACRES) =      0.73      SUBAREA RUNOFF(CFS) =    1.94
   EFFECTIVE AREA(ACRES) =      1.20      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =      3.22

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.34   FLOW VELOCITY(FEET/SEC.) = 9.37
   LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40512.00 =    445.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40512.00 TO NODE  40513.00 IS CODE =  51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     650.00  DOWNSTREAM(FEET) =     581.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  152.00   CHANNEL SLOPE =  0.4539
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.196
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap        SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)    CN
   USER-DEFINED               -       1.36      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) =      4.99
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.69
   AVERAGE FLOW DEPTH(FEET) =  0.44    TRAVEL TIME(MIN.) =   0.29
   Tc(MIN.) =   9.35
   SUBAREA AREA(ACRES) =      1.36      SUBAREA RUNOFF(CFS) =    3.54
   EFFECTIVE AREA(ACRES) =      2.56      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) =      6.67

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.49   FLOW VELOCITY(FEET/SEC.) = 9.44
   LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40513.00 =    597.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40513.00 TO NODE  40514.00 IS CODE =  51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     581.00  DOWNSTREAM(FEET) =     500.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE =  0.4629
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
```

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   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.116
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap        SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)    CN
   USER-DEFINED               -       2.32      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) =      9.61
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.43
   AVERAGE FLOW DEPTH(FEET) =  0.55    TRAVEL TIME(MIN.) =   0.28
   Tc(MIN.) =   9.63
   SUBAREA AREA(ACRES) =      2.32      SUBAREA RUNOFF(CFS) =    5.87
   EFFECTIVE AREA(ACRES) =      4.88      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        4.9        PEAK FLOW RATE(CFS) =     12.36

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.61   FLOW VELOCITY(FEET/SEC.) = 10.96
   LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40514.00 =    772.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40514.00 TO NODE  40515.00 IS CODE =  51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     500.00  DOWNSTREAM(FEET) =     440.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  206.00   CHANNEL SLOPE =  0.2913
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.016
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap        SCS
         LAND USE           GROUP    (ACRES)   (INCH/HR)  (DECIMAL)    CN
   USER-DEFINED               -       2.15      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) =     14.99
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.79
   AVERAGE FLOW DEPTH(FEET) =  0.71    TRAVEL TIME(MIN.) =   0.35
   Tc(MIN.) =   9.98
   SUBAREA AREA(ACRES) =      2.15      SUBAREA RUNOFF(CFS) =    5.26
   EFFECTIVE AREA(ACRES) =      7.03      AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        7.0        PEAK FLOW RATE(CFS) =     17.18

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.75   FLOW VELOCITY(FEET/SEC.) = 10.12
   LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40515.00 =    978.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  40515.00 TO NODE  40516.00 IS CODE =  51
-----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     440.00  DOWNSTREAM(FEET) =     390.00
```

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    CHANNEL LENGTH THRU SUBAREA(FEET) =   269.00   CHANNEL SLOPE =  0.1859
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  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              -         5.24      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) =      23.44
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.23
    AVERAGE FLOW DEPTH(FEET) =  0.92    TRAVEL TIME(MIN.) =  0.49
    Tc(MIN.) =   10.46
    SUBAREA AREA(ACRES) =    5.24       SUBAREA RUNOFF(CFS) =   12.52
    EFFECTIVE AREA(ACRES) =   12.27     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =       12.3          PEAK FLOW RATE(CFS) =      29.29

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.00    FLOW VELOCITY(FEET/SEC.) =   9.72
    LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40516.00 =   1247.00 FEET.

***************************************************************************
    FLOW PROCESS FROM NODE  40516.00 TO NODE  40517.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   390.00  DOWNSTREAM(FEET) =    355.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   384.00   CHANNEL SLOPE =  0.0911
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.850
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
          LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -         4.01      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) =      33.90
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.74
    AVERAGE FLOW DEPTH(FEET) =  1.21    TRAVEL TIME(MIN.) =  0.83
    Tc(MIN.) =   11.29
    SUBAREA AREA(ACRES) =    4.01       SUBAREA RUNOFF(CFS) =    9.21
    EFFECTIVE AREA(ACRES) =   16.28     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =       16.3          PEAK FLOW RATE(CFS) =      37.37

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.25    FLOW VELOCITY(FEET/SEC.) =   7.92
    LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40517.00 =   1631.00 FEET.

***************************************************************************
    FLOW PROCESS FROM NODE  40517.00 TO NODE  40518.00 IS CODE = 51
-------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
=========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   355.00  DOWNSTREAM(FEET) =    341.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   512.00   CHANNEL SLOPE =  0.0273
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
    *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.690
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
          LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
    USER-DEFINED              -         8.89      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) =      46.93
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.63
    AVERAGE FLOW DEPTH(FEET) =  1.54    TRAVEL TIME(MIN.) =  1.29
    Tc(MIN.) =   12.58
    SUBAREA AREA(ACRES) =    8.89       SUBAREA RUNOFF(CFS) =   19.13
    EFFECTIVE AREA(ACRES) =   25.17     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =       25.2          PEAK FLOW RATE(CFS) =      54.15

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.62    FLOW VELOCITY(FEET/SEC.) =   6.88
    LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40518.00 =   2143.00 FEET.

***************************************************************************
    FLOW PROCESS FROM NODE  40518.00 TO NODE  40518.00 IS CODE =  1
-------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
=========================================================================
    TOTAL NUMBER OF STREAMS = 2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =  12.58
    RAINFALL INTENSITY(INCH/HR) =   2.69
    AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30
    AREA-AVERAGED Ap =  1.00
    EFFECTIVE STREAM AREA(ACRES) =      25.17
    TOTAL STREAM AREA(ACRES) =       25.17
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      54.15

    ** CONFLUENCE DATA **
    STREAM      Q      Tc    Intensity  Fp(Fm)     Ap      Ae      HEADWATER
    NUMBER     (CFS)  (MIN.) (INCH/HR)  (INCH/HR)        (ACRES)     NODE
      1        80.56  14.10   2.501    0.30( 0.30) 1.00    40.7    40500.00
      2        54.15  12.58   2.690    0.30( 0.30) 1.00    25.2    40510.00

    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       132.17  12.58   2.690    0.30( 0.30) 1.00    61.4    40510.00
      2       130.43  14.10   2.501    0.30( 0.30) 1.00    65.8    40500.00

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =      132.17    Tc(MIN.) =     12.58
  EFFECTIVE AREA(ACRES) =       61.44   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       65.8
  LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40518.00 =    3095.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40518.00 TO NODE  40519.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     341.00  DOWNSTREAM(FEET) =      333.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    688.00   CHANNEL SLOPE = 0.0116
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.464
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        3.34     0.30      1.000      -
  USER-DEFINED               -        2.15     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) =     137.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.30
  AVERAGE FLOW DEPTH(FEET) =   2.70   TRAVEL TIME(MIN.) =   1.82
  Tc(MIN.) =   14.40
  SUBAREA AREA(ACRES) =      5.49        SUBAREA RUNOFF(CFS) =   10.69
  EFFECTIVE AREA(ACRES) =      66.93     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =      71.3         PEAK FLOW RATE(CFS) =      132.17
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 2.66   FLOW VELOCITY(FEET/SEC.) =   6.24
  LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40519.00 =    3783.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)        (ACRES)    NODE
     1      132.17   14.40    2.464   0.30( 0.30)  1.00    66.9   40510.00
     2      130.43   15.93    2.323   0.30( 0.30)  1.00    71.3   40500.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      132.17  Tc(MIN.) =    14.40
  AREA-AVERAGED Fm(INCH/HR) =  0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =       66.93

*************************************************************************
  FLOW PROCESS FROM NODE  40519.00 TO NODE  40519.00 IS CODE = 81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
  MAINLINE Tc(MIN.) =   14.40
  * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.464
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  USER-DEFINED               -        0.35     0.30      0.500      -
  USER-DEFINED               -        4.48     0.30      1.000      -
  USER-DEFINED               -        0.38     0.30      1.000      -
  USER-DEFINED               -        1.49     0.30      1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.974
  SUBAREA AREA(ACRES) =      6.70        SUBAREA RUNOFF(CFS) =   13.10
  EFFECTIVE AREA(ACRES) =      73.63     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      78.0         PEAK FLOW RATE(CFS) =      143.48
=========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =      78.0  TC(MIN.) =     14.40
  EFFECTIVE AREA(ACRES) =      73.63  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.998
  PEAK FLOW RATE(CFS)     =      143.48

  ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)        (ACRES)    NODE
     1      143.48   14.40    2.464   0.30( 0.30)  1.00    73.6   40510.00
     2      142.11   15.93    2.323   0.30( 0.30)  1.00    78.0   40500.00
=========================================================================
=========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                     Michael Baker International
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                         Santa Ana, CA92707


  ************************** DESCRIPTION OF STUDY ************************
 * RMV PA-4 WATERSHED 6 EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
 * 50-YR EV MARCH 2019 CCHIU                                           *
  *********************************************************************

   FILE NAME: X40650EV.DAT
   TIME/DATE OF STUDY: 09:25 03/25/2019
 ========================================================================
   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;  0.170
   *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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
```

```
   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  40600.00 TO NODE  40601.00 IS CODE =  21
 --------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   279.00
   ELEVATION DATA: UPSTREAM(FEET) =   1054.00  DOWNSTREAM(FEET) =   1000.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.326
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 3.203
   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"              -        0.54      0.30     1.000     0   9.33
   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) =       0.54   PEAK FLOW RATE(CFS) =      1.42


 ****************************************************************************
   FLOW PROCESS FROM NODE  40601.00 TO NODE  40602.00 IS CODE =  51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    985.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   199.00   CHANNEL SLOPE = 0.0754
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.982
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap     SCS
      LAND USE             GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        0.76      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) =       2.34
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.67
   AVERAGE FLOW DEPTH(FEET) =  0.46    TRAVEL TIME(MIN.) =   0.90
   Tc(MIN.) =   10.23
   SUBAREA AREA(ACRES) =     0.76        SUBAREA RUNOFF(CFS) =    1.83
   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) =       3.14

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
    DEPTH(FEET) =  0.51   FLOW VELOCITY(FEET/SEC.) =   3.96
    LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40602.00 =    478.00 FEET.


************************************************************************
   FLOW PROCESS FROM NODE  40602.00 TO NODE  40603.00 IS CODE =  51
--------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    985.00  DOWNSTREAM(FEET) =    958.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  282.00   CHANNEL SLOPE =  0.0957
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.858
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        1.11     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) =      4.42
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.70
   AVERAGE FLOW DEPTH(FEET) =  0.56   TRAVEL TIME(MIN.) =   1.00
   Tc(MIN.) =   11.23
   SUBAREA AREA(ACRES) =     1.11      SUBAREA RUNOFF(CFS) =    2.56
   EFFECTIVE AREA(ACRES) =      2.41     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =       5.55

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =   5.02
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40603.00 =    760.00 FEET.


************************************************************************
   FLOW PROCESS FROM NODE  40603.00 TO NODE  40604.00 IS CODE =  51
--------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    958.00  DOWNSTREAM(FEET) =    940.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  219.00   CHANNEL SLOPE =  0.0822
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        0.36     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) =      5.95
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.79
   AVERAGE FLOW DEPTH(FEET) =  0.64   TRAVEL TIME(MIN.) =   0.76
   Tc(MIN.) =   11.99
   SUBAREA AREA(ACRES) =     0.36      SUBAREA RUNOFF(CFS) =    0.79
   EFFECTIVE AREA(ACRES) =      2.77     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        2.8        PEAK FLOW RATE(CFS) =       6.14
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.65   FLOW VELOCITY(FEET/SEC.) =   4.82
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40604.00 =    979.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  40604.00 TO NODE  40605.00 IS CODE =  51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    940.00  DOWNSTREAM(FEET) =    800.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  547.00   CHANNEL SLOPE =  0.2559
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  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              -        3.00     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) =      9.28
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.23
   AVERAGE FLOW DEPTH(FEET) =  0.61   TRAVEL TIME(MIN.) =   1.11
   Tc(MIN.) =   13.10
   SUBAREA AREA(ACRES) =     3.00      SUBAREA RUNOFF(CFS) =    6.28
   EFFECTIVE AREA(ACRES) =      5.77     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) =      12.07

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.68   FLOW VELOCITY(FEET/SEC.) =   8.80
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40605.00 =   1526.00 FEET.


*************************************************************************
   FLOW PROCESS FROM NODE  40605.00 TO NODE  40606.00 IS CODE =  51
---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    680.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  277.00   CHANNEL SLOPE =  0.4332
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.575
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        2.22     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) =     14.35
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.21
   AVERAGE FLOW DEPTH(FEET) =  0.65   TRAVEL TIME(MIN.) =   0.41
   Tc(MIN.) =   13.51
   SUBAREA AREA(ACRES) =     2.22      SUBAREA RUNOFF(CFS) =    4.55
   EFFECTIVE AREA(ACRES) =      7.99     AREA-AVERAGED Fm(INCH/HR) =   0.30
```

```
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        8.0        PEAK FLOW RATE(CFS) =      16.36

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.68   FLOW VELOCITY(FEET/SEC.) = 11.66
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40606.00 =    1803.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40606.00 TO NODE  40607.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     680.00  DOWNSTREAM(FEET) =     670.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    59.00   CHANNEL SLOPE = 0.1695
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.561
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp       Ap      SCS
       LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        9.34      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) =     25.86
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.13
   AVERAGE FLOW DEPTH(FEET) =   0.97   TRAVEL TIME(MIN.) =   0.11
   Tc(MIN.) =   13.62
   SUBAREA AREA(ACRES) =      9.34       SUBAREA RUNOFF(CFS) =   19.00
   EFFECTIVE AREA(ACRES) =      17.33      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       17.3        PEAK FLOW RATE(CFS) =      35.26

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.09   FLOW VELOCITY(FEET/SEC.) =  9.82
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40607.00 =    1862.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40607.00 TO NODE  40608.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     670.00  DOWNSTREAM(FEET) =     585.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   246.00   CHANNEL SLOPE = 0.3455
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.523
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp       Ap      SCS
       LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        4.64      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) =     39.90
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 13.24
   AVERAGE FLOW DEPTH(FEET) =   1.00   TRAVEL TIME(MIN.) =   0.31
   Tc(MIN.) =   13.93
```

```
   SUBAREA AREA(ACRES) =        4.64        SUBAREA RUNOFF(CFS) =    9.27
   EFFECTIVE AREA(ACRES) =       21.96      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         22.0        PEAK FLOW RATE(CFS) =      43.94

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.03   FLOW VELOCITY(FEET/SEC.) = 13.68
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40608.00 =    2108.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40608.00 TO NODE  40609.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     585.00  DOWNSTREAM(FEET) =     494.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   482.00   CHANNEL SLOPE = 0.1888
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.435
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp       Ap      SCS
       LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        8.61      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) =     52.21
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.34
   AVERAGE FLOW DEPTH(FEET) =   1.24   TRAVEL TIME(MIN.) =   0.71
   Tc(MIN.) =   14.64
   SUBAREA AREA(ACRES) =        8.61        SUBAREA RUNOFF(CFS) =   16.55
   EFFECTIVE AREA(ACRES) =       30.57      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         30.6        PEAK FLOW RATE(CFS) =      58.75

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.29   FLOW VELOCITY(FEET/SEC.) = 11.69
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40609.00 =    2590.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40609.00 TO NODE  40610.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     494.00  DOWNSTREAM(FEET) =     470.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   236.00   CHANNEL SLOPE = 0.1017
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.387
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp       Ap      SCS
       LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       18.33      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) =     75.97
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.90
```

```
   AVERAGE FLOW DEPTH(FEET) =   1.60    TRAVEL TIME(MIN.) =    0.40
   Tc(MIN.) =  15.03
   SUBAREA AREA(ACRES) =    18.33      SUBAREA RUNOFF(CFS) =   34.44
   EFFECTIVE AREA(ACRES) =    48.90     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       48.9        PEAK FLOW RATE(CFS) =     91.88

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.72   FLOW VELOCITY(FEET/SEC.) =  10.34
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40610.00 =   2826.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40610.00 TO NODE  40611.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   470.00  DOWNSTREAM(FEET) =    425.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  560.00   CHANNEL SLOPE = 0.0804
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.318
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -          10.11    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) =    101.06
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.69
   AVERAGE FLOW DEPTH(FEET) =   1.86    TRAVEL TIME(MIN.) =   0.96
   Tc(MIN.) =  16.00
   SUBAREA AREA(ACRES) =    10.11      SUBAREA RUNOFF(CFS) =   18.36
   EFFECTIVE AREA(ACRES) =    59.01     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       59.0        PEAK FLOW RATE(CFS) =    107.19

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.90   FLOW VELOCITY(FEET/SEC.) =  9.85
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40611.00 =   3386.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40611.00 TO NODE  40612.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   425.00  DOWNSTREAM(FEET) =    373.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  906.00   CHANNEL SLOPE = 0.0574
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 15 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
   USER-DEFINED             -          20.87    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) =    125.02
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.03
   AVERAGE FLOW DEPTH(FEET) =   2.15    TRAVEL TIME(MIN.) =   1.67
   Tc(MIN.) =  17.67
   SUBAREA AREA(ACRES) =    20.87      SUBAREA RUNOFF(CFS) =   35.65
   EFFECTIVE AREA(ACRES) =    79.89     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       79.9        PEAK FLOW RATE(CFS) =    136.44

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.22   FLOW VELOCITY(FEET/SEC.) =  9.20
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40612.00 =   4292.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40612.00 TO NODE  40613.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   373.00  DOWNSTREAM(FEET) =    328.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1192.00   CHANNEL SLOPE = 0.0378
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.052
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
         LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -          0.04     0.30     1.000     -
   USER-DEFINED             -          0.14     0.30     1.000     -
   USER-DEFINED             -          0.96     0.30     1.000     -
   USER-DEFINED             -          0.21     0.30     1.000     -
   USER-DEFINED             -          0.71     0.30     1.000     -
   USER-DEFINED             -          3.41     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) =    140.76
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.83
   AVERAGE FLOW DEPTH(FEET) =   2.18    TRAVEL TIME(MIN.) =   2.02
   Tc(MIN.) =  19.69
   SUBAREA AREA(ACRES) =     5.47      SUBAREA RUNOFF(CFS) =    8.63
   EFFECTIVE AREA(ACRES) =    85.36     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       85.4        PEAK FLOW RATE(CFS) =    136.44
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.16   FLOW VELOCITY(FEET/SEC.) =  9.78
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40613.00 =   5484.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  40613.00 TO NODE  40613.00 IS CODE = 81
-------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=========================================================================
   MAINLINE Tc(MIN.) =  19.69
   * 15 YEAR RAINFALL INTENSITY(INCH/HR) = 2.052
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
```

```
        LAND USE              GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                 -         0.07       0.30      1.000     -
  USER-DEFINED                 -         0.69       0.30      1.000     -
  USER-DEFINED                 -         0.99       0.30      1.000     -
  USER-DEFINED                 -         4.13       0.30      1.000     -
  USER-DEFINED                 -         0.72       0.30      1.000     -
  USER-DEFINED                 -         0.26       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) =    6.86      SUBAREA RUNOFF(CFS) =    10.82
  EFFECTIVE AREA(ACRES) =     92.22    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      92.2       PEAK FLOW RATE(CFS) =     145.42


*******************************************************************************
  FLOW PROCESS FROM NODE  40613.00 TO NODE  40613.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =   19.69
  *  15 YEAR RAINFALL INTENSITY(INCH/HR) =  2.052
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp         Ap       SCS
       LAND USE              GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                 -         6.92       0.30      1.000     -
  USER-DEFINED                 -         2.35       0.30      1.000     -
  USER-DEFINED                 -         0.47       0.30      1.000     -
  USER-DEFINED                 -         3.66       0.30      1.000     -
  USER-DEFINED                 -         0.31       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) =   13.71      SUBAREA RUNOFF(CFS) =    21.62
  EFFECTIVE AREA(ACRES) =    105.93    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      105.9      PEAK FLOW RATE(CFS) =     167.04
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     105.9  TC(MIN.) =     19.69
  EFFECTIVE AREA(ACRES) =    105.93  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =     167.04
===============================================================================
===============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                        Michael Baker International
                      5 Hutton Centre Drive Suite 500
                           Santa Ana, CA 92707


 *************************** DESCRIPTION OF STUDY ***************************
 * RMV PA-3 WATERSHED 3 EXISTING CONDITION                                 *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                   *
 * 100-YR EV  MARCH 2019 ROKAMOTO                                          *
 **************************************************************************

  FILE NAME: X30300EV.DAT
  TIME/DATE OF STUDY: 15:55 03/21/2019
 ==========================================================================
  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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30300.00 TO NODE  30301.00 IS CODE =  21
 --------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ==========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
  ELEVATION DATA: UPSTREAM(FEET) =   622.00  DOWNSTREAM(FEET) =   551.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.676
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.320
  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
  "CHAPARRAL,NARROWLEAF"    -        1.80    0.30     1.000    98   9.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     4.89
  TOTAL AREA(ACRES) =        1.80   PEAK FLOW RATE(CFS) =      4.89

 ****************************************************************************
  FLOW PROCESS FROM NODE  30301.00 TO NODE  30302.00 IS CODE =  51
 --------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   551.00  DOWNSTREAM(FEET) =   508.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 2187.00   CHANNEL SLOPE = 0.0197
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.148
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap     SCS
       LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        6.70    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) =     10.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.25
  AVERAGE FLOW DEPTH(FEET) =   1.04   TRAVEL TIME(MIN.) = 11.21
  Tc(MIN.) =   20.89
  SUBAREA AREA(ACRES) =      6.70      SUBAREA RUNOFF(CFS) =   11.14
  EFFECTIVE AREA(ACRES) =      8.50      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        8.5         PEAK FLOW RATE(CFS) =     14.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.16   FLOW VELOCITY(FEET/SEC.) =   3.49
  LONGEST FLOWPATH FROM NODE  30300.00 TO NODE  30302.00 =    2512.00 FEET.
 ==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =         8.5  TC(MIN.) =     20.89
  EFFECTIVE AREA(ACRES) =        8.50  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       14.14
 ==========================================================================
 ==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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_____
***************************************************************
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                        Analysis prepared by:

                     Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA 92707


  ************************* DESCRIPTION OF STUDY *************************
  * RMV PA-3 WATERSHED 4A EXISTING CONDITION                           *
  * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
  * 100-YR EV  MARCH 2019 ROKAMOTO                                     *
  ********************************************************************

   FILE NAME: X34A00EV.DAT
   TIME/DATE OF STUDY: 15:48 03/21/2019
  ===============================================================================
   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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  30400.00 TO NODE  30401.00 IS CODE = 21
  -------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
  ===============================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
   ELEVATION DATA: UPSTREAM(FEET) =   615.00  DOWNSTREAM(FEET) =    580.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.150
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.658
   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.)
   AGRICULTURAL POOR COVER
   "ROW CROPS,STRAIGHT ROW"   -       0.26     0.30     1.000    98   8.15
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =      0.78
   TOTAL AREA(ACRES) =       0.26   PEAK FLOW RATE(CFS) =      0.78

  *******************************************************************************
   FLOW PROCESS FROM NODE  30401.00 TO NODE  30402.00 IS CODE = 51
  -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    580.00  DOWNSTREAM(FEET) =    540.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  220.00   CHANNEL SLOPE = 0.1818
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.466
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp       Ap      SCS
         LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -       0.40     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) =    1.34
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.49
   AVERAGE FLOW DEPTH(FEET) =   0.32    TRAVEL TIME(MIN.) =   0.82
   Tc(MIN.) =   8.97
   SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    1.13
   EFFECTIVE AREA(ACRES) =       0.65     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =    0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         0.7        PEAK FLOW RATE(CFS) =      1.86

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.36   FLOW VELOCITY(FEET/SEC.) =  4.90
   LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30402.00 =    536.00 FEET.

  *******************************************************************************
   FLOW PROCESS FROM NODE  30402.00 TO NODE  30403.00 IS CODE = 51
  -------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    491.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  151.00   CHANNEL SLOPE = 0.3245
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.389
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp         Ap       SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED               -         0.12      0.30      1.000     -
 USER-DEFINED               -         0.86      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) =       3.22
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.93
 AVERAGE FLOW DEPTH(FEET) = 0.39   TRAVEL TIME(MIN.) =  0.36
 Tc(MIN.) =    9.33
 SUBAREA AREA(ACRES) =      0.98      SUBAREA RUNOFF(CFS) =    2.72
 EFFECTIVE AREA(ACRES) =      1.63      AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        1.6        PEAK FLOW RATE(CFS) =      4.54

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   FLOW VELOCITY(FEET/SEC.) = 7.56
 LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30403.00 =    687.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30403.00 TO NODE  30404.00 IS CODE = 51
-----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    491.00  DOWNSTREAM(FEET) =    473.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE = 0.1059
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.288
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp         Ap       SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED               -         1.00      0.30      1.000     -
 USER-DEFINED               -         1.00      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) =       7.23
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.55
 AVERAGE FLOW DEPTH(FEET) = 0.66   TRAVEL TIME(MIN.) =  0.51
 Tc(MIN.) =    9.84
 SUBAREA AREA(ACRES) =      2.00      SUBAREA RUNOFF(CFS) =    5.38
 EFFECTIVE AREA(ACRES) =      3.63      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) =      9.77

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.74   FLOW VELOCITY(FEET/SEC.) = 5.99
 LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30404.00 =    857.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  30404.00 TO NODE  30405.00 IS CODE = 51
-----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    473.00  DOWNSTREAM(FEET) =    430.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   289.00   CHANNEL SLOPE = 0.1488
```

```
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.196
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp         Ap       SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED               -        20.80      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) =      36.88
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.47
 AVERAGE FLOW DEPTH(FEET) = 1.14   TRAVEL TIME(MIN.) =  0.51
 Tc(MIN.) =   10.35
 SUBAREA AREA(ACRES) =     20.80      SUBAREA RUNOFF(CFS) =   54.21
 EFFECTIVE AREA(ACRES) =     24.43      AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       24.4        PEAK FLOW RATE(CFS) =     63.67

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.40   FLOW VELOCITY(FEET/SEC.) = 10.84
 LONGEST FLOWPATH FROM NODE  30400.00 TO NODE  30405.00 =   1146.00 FEET.
=============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       24.4  TC(MIN.) =      10.35
 EFFECTIVE AREA(ACRES) =      24.43  AREA-AVERAGED Fm(INCH/HR)= 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)   =      63.67
=============================================================================
=============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
_____
*************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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          Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                      Analysis prepared by:

                   Michael Baker International
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                     Santa Ana, CA 92707


 *************************** DESCRIPTION OF STUDY **************************
* RMV PA-3 WATERSHED 4B EXISTING CONDITION                               *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
* 100-YR EV  MARCH 2019 ROKAMOTO                                         *
 *************************************************************************

  FILE NAME: X34B00EV.DAT
  TIME/DATE OF STUDY: 15:41 03/21/2019
=========================================================================
  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  60.0    30.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth =  0.00 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  30410.00 TO NODE  30411.00 IS CODE = 21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
  ELEVATION DATA: UPSTREAM(FEET) =   615.00  DOWNSTREAM(FEET) =   558.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.546
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.821
  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.)
  AGRICULTURAL POOR COVER
  "ROW CROPS,STRAIGHT ROW"  -         0.59     0.30     1.000     98   7.55
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      1.87
  TOTAL AREA(ACRES) =       0.59   PEAK FLOW RATE(CFS) =      1.87

*************************************************************************
  FLOW PROCESS FROM NODE  30411.00 TO NODE  30412.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   558.00  DOWNSTREAM(FEET) =   534.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 137.00   CHANNEL SLOPE = 0.1752
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.707
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap     SCS
       LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -         0.85     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) =     3.17
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.47
  AVERAGE FLOW DEPTH(FEET) =   0.44   TRAVEL TIME(MIN.) =   0.42
  Tc(MIN.) =    7.96
  SUBAREA AREA(ACRES) =     0.85       SUBAREA RUNOFF(CFS) =    2.59
  EFFECTIVE AREA(ACRES) =     1.44       AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =     4.40

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   5.90
  LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30412.00 =    464.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30412.00 TO NODE  30413.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   534.00  DOWNSTREAM(FEET) =   504.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 204.00   CHANNEL SLOPE = 0.1471
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.568
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -         1.59     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) =       6.74
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.12
 AVERAGE FLOW DEPTH(FEET) =  0.61   TRAVEL TIME(MIN.) =  0.56
 Tc(MIN.) =   8.52
 SUBAREA AREA(ACRES) =     1.59      SUBAREA RUNOFF(CFS) =   4.67
 EFFECTIVE AREA(ACRES) =     3.02     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) =      8.89

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.67   FLOW VELOCITY(FEET/SEC.) =  6.63
 LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30413.00 =    668.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE  30413.00 TO NODE  30414.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    504.00  DOWNSTREAM(FEET) =    472.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE = 0.1296
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 25 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
 USER-DEFINED             -         3.99     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) =      14.53
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.18
 AVERAGE FLOW DEPTH(FEET) =  0.82   TRAVEL TIME(MIN.) =  0.57
 Tc(MIN.) =   9.09
 SUBAREA AREA(ACRES) =     3.99      SUBAREA RUNOFF(CFS) =  11.27
 EFFECTIVE AREA(ACRES) =     7.01     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =         7.0        PEAK FLOW RATE(CFS) =     19.81

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.93   FLOW VELOCITY(FEET/SEC.) =  7.70
 LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30414.00 =    915.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE  30414.00 TO NODE  30415.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    472.00  DOWNSTREAM(FEET) =    447.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   345.00   CHANNEL SLOPE = 0.0725
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.270
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -         6.31     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) =      28.24
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.79
 AVERAGE FLOW DEPTH(FEET) =  1.18   TRAVEL TIME(MIN.) =  0.85
 Tc(MIN.) =   9.94
 SUBAREA AREA(ACRES) =     6.31      SUBAREA RUNOFF(CFS) =  16.86
 EFFECTIVE AREA(ACRES) =    13.32     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        13.3        PEAK FLOW RATE(CFS) =     35.61

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.28   FLOW VELOCITY(FEET/SEC.) =  7.19
 LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30415.00 =   1260.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE  30415.00 TO NODE  30416.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =    403.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   781.00   CHANNEL SLOPE = 0.0563
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.971
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -        11.95     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) =      49.99
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.11
 AVERAGE FLOW DEPTH(FEET) =  1.53   TRAVEL TIME(MIN.) =  1.83
 Tc(MIN.) =  11.77
 SUBAREA AREA(ACRES) =    11.95      SUBAREA RUNOFF(CFS) =  28.73
 EFFECTIVE AREA(ACRES) =    25.27     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        25.3        PEAK FLOW RATE(CFS) =     60.76

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.65   FLOW VELOCITY(FEET/SEC.) =  7.48
 LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30416.00 =   2041.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE  30416.00 TO NODE  30417.00 IS CODE = 51
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    403.00  DOWNSTREAM(FEET) =    387.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   383.00   CHANNEL SLOPE = 0.0418
```

```
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.849
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp          Ap       SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)   (DECIMAL)    CN
    USER-DEFINED             -         2.70       0.30       1.000       -
    USER-DEFINED             -         2.80       0.30       1.000       -
    USER-DEFINED             -         2.90       0.30       1.000       -
    USER-DEFINED             -         0.90       0.30       1.000       -
    USER-DEFINED             -         0.10       0.30       1.000       -
    USER-DEFINED             -         3.20       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) =      75.21
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.04
    AVERAGE FLOW DEPTH(FEET) =  1.89   TRAVEL TIME(MIN.) =   0.91
    Tc(MIN.) =   12.68
    SUBAREA AREA(ACRES) =    12.60       SUBAREA RUNOFF(CFS) =   28.91
    EFFECTIVE AREA(ACRES) =     37.87     AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =      37.9        PEAK FLOW RATE(CFS) =      86.89

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.99   FLOW VELOCITY(FEET/SEC.) =   7.33
    LONGEST FLOWPATH FROM NODE  30410.00 TO NODE  30417.00 =    2424.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE  30417.00 TO NODE  30417.00 IS CODE = 81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.68
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.849
  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             -         0.10       0.30       1.000       -
  USER-DEFINED             -         0.70       0.30       1.000       -
  USER-DEFINED             -         0.20       0.30       1.000       -
  USER-DEFINED             -         0.90       0.30       1.000       -
  USER-DEFINED             -         0.10       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) =    2.60       SUBAREA RUNOFF(CFS) =    5.96
  EFFECTIVE AREA(ACRES) =     40.47    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       40.5        PEAK FLOW RATE(CFS) =      92.85

******************************************************************************
  FLOW PROCESS FROM NODE  30417.00 TO NODE  30417.00 IS CODE = 81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.68
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.849
  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             -         0.30       0.30       1.000       -
  USER-DEFINED             -         0.10       0.30       1.000       -
  USER-DEFINED             -         0.10       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) =    1.50       SUBAREA RUNOFF(CFS) =    3.44
  EFFECTIVE AREA(ACRES) =     41.97    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       42.0        PEAK FLOW RATE(CFS) =       96.29
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =         42.0  TC(MIN.) =     12.68
  EFFECTIVE AREA(ACRES) =     41.97 AREA-AVERAGED Fm(INCH/HR)=   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =        96.29
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 _____
 *************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
             (c) Copyright 1983-2013 Advanced Engineering Software (aes)
               Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                          Analysis prepared by:

                        Michael Baker International
                      5 Hutton Centre Drive Suite 500
                          Santa Ana, CA 92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 5A EXISTING CONDITION                             *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 100-YR EV  MARCH 2019 ROKAMOTO                                       *
 ************************************************************************

  FILE NAME: X35A00EV.DAT
  TIME/DATE OF STUDY: 12:11 03/21/2019
 =======================================================================
  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  60.0    30.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30500.00 TO NODE  30501.00 IS CODE = 21
 ---------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =====================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   303.00
  ELEVATION DATA: UPSTREAM(FEET) =   769.00  DOWNSTREAM(FEET) =    695.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.201
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.416
  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"               -        1.01    0.30     1.000     0   9.20
  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) =       1.01   PEAK FLOW RATE(CFS) =      2.82

 ***********************************************************************
  FLOW PROCESS FROM NODE  30501.00 TO NODE  30502.00 IS CODE = 51
 ---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.00  DOWNSTREAM(FEET) =    665.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  167.00   CHANNEL SLOPE = 0.1796
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.320
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp       Ap     SCS
      LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        0.89    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) =     4.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.88
  AVERAGE FLOW DEPTH(FEET) =   0.48    TRAVEL TIME(MIN.) =   0.47
  Tc(MIN.) =   9.67
  SUBAREA AREA(ACRES) =      0.89       SUBAREA RUNOFF(CFS) =    2.41
  EFFECTIVE AREA(ACRES) =      1.89     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         1.9        PEAK FLOW RATE(CFS) =      5.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =   6.26
  LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30502.00 =     470.00 FEET.

 ***********************************************************************
  FLOW PROCESS FROM NODE  30502.00 TO NODE  30503.00 IS CODE = 51
 ---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   665.00  DOWNSTREAM(FEET) =    645.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  110.00   CHANNEL SLOPE = 0.1818
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.268
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL     AREA        Fp          Ap        SCS
      LAND USE          GROUP      (ACRES)   (INCH/HR)   (DECIMAL)   CN
 USER-DEFINED             -          0.98      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) =       6.46
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.64
 AVERAGE FLOW DEPTH(FEET) =  0.57   TRAVEL TIME(MIN.) =  0.28
 Tc(MIN.) =   9.95
 SUBAREA AREA(ACRES) =     0.98      SUBAREA RUNOFF(CFS) =    2.62
 EFFECTIVE AREA(ACRES) =     2.88     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       2.9      PEAK FLOW RATE(CFS) =       7.68

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.61   FLOW VELOCITY(FEET/SEC.) =  6.94
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30503.00 =    580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30503.00 TO NODE  30504.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    630.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  152.00   CHANNEL SLOPE = 0.0987
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.193
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA        Fp          Ap        SCS
      LAND USE          GROUP      (ACRES)   (INCH/HR)   (DECIMAL)   CN
 USER-DEFINED             -          3.30      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) =      11.98
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.15
 AVERAGE FLOW DEPTH(FEET) =  0.81   TRAVEL TIME(MIN.) =  0.41
 Tc(MIN.) =  10.36
 SUBAREA AREA(ACRES) =     3.30      SUBAREA RUNOFF(CFS) =    8.60
 EFFECTIVE AREA(ACRES) =     6.18     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       6.2      PEAK FLOW RATE(CFS) =      16.08

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.90   FLOW VELOCITY(FEET/SEC.) =  6.66
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30504.00 =    732.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30504.00 TO NODE  30505.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    600.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  329.00   CHANNEL SLOPE = 0.0912
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
* 25 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             -          7.11      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) =      24.94
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.15
 AVERAGE FLOW DEPTH(FEET) =  1.08   TRAVEL TIME(MIN.) =  0.77
 Tc(MIN.) =  11.13
 SUBAREA AREA(ACRES) =     7.11      SUBAREA RUNOFF(CFS) =   17.70
 EFFECTIVE AREA(ACRES) =    13.28     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      13.3      PEAK FLOW RATE(CFS) =      33.08

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.19   FLOW VELOCITY(FEET/SEC.) =  7.72
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30505.00 =   1061.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30505.00 TO NODE  30506.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    585.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  297.00   CHANNEL SLOPE = 0.0505
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.957
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL     AREA        Fp          Ap        SCS
      LAND USE          GROUP      (ACRES)   (INCH/HR)   (DECIMAL)   CN
 USER-DEFINED             -         10.71      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) =      45.89
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.68
 AVERAGE FLOW DEPTH(FEET) =  1.51   TRAVEL TIME(MIN.) =  0.74
 Tc(MIN.) =  11.87
 SUBAREA AREA(ACRES) =    10.71      SUBAREA RUNOFF(CFS) =   25.61
 EFFECTIVE AREA(ACRES) =    24.00     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      24.0      PEAK FLOW RATE(CFS) =      57.38

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.65   FLOW VELOCITY(FEET/SEC.) =  7.07
 LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30506.00 =   1358.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30506.00 TO NODE  30507.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    585.00  DOWNSTREAM(FEET) =    550.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  700.00   CHANNEL SLOPE = 0.0500
```

```
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 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             -        15.01       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) =      73.99
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.50
   AVERAGE FLOW DEPTH(FEET) =  1.81   TRAVEL TIME(MIN.) =   1.55
   Tc(MIN.) =   13.43
   SUBAREA AREA(ACRES) =    15.01      SUBAREA RUNOFF(CFS) =   33.21
   EFFECTIVE AREA(ACRES) =     39.01      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      39.0            PEAK FLOW RATE(CFS) =      86.29

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.92   FLOW VELOCITY(FEET/SEC.) =  7.80
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30507.00 =   2058.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30507.00 TO NODE  30508.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     550.00  DOWNSTREAM(FEET) =     500.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1107.00   CHANNEL SLOPE = 0.0452
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.526
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap     SCS
        LAND USE          GROUP     (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        34.74       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) =     121.11
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.17
   AVERAGE FLOW DEPTH(FEET) =  2.22   TRAVEL TIME(MIN.) =   2.26
   Tc(MIN.) =   15.68
   SUBAREA AREA(ACRES) =    34.74      SUBAREA RUNOFF(CFS) =   69.59
   EFFECTIVE AREA(ACRES) =     73.74      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      73.7            PEAK FLOW RATE(CFS) =     147.72

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.39   FLOW VELOCITY(FEET/SEC.) =  8.60
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30508.00 =   3165.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30508.00 TO NODE  30518.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =     500.00  DOWNSTREAM(FEET) =     465.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  982.00   CHANNEL SLOPE = 0.0356
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.357
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap     SCS
        LAND USE          GROUP     (ACRES)   (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        11.69       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) =     158.54
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.01
   AVERAGE FLOW DEPTH(FEET) =  2.57   TRAVEL TIME(MIN.) =   2.04
   Tc(MIN.) =   17.73
   SUBAREA AREA(ACRES) =    11.69      SUBAREA RUNOFF(CFS) =   21.64
   EFFECTIVE AREA(ACRES) =     85.43      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      85.4            PEAK FLOW RATE(CFS) =     158.13

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.57   FLOW VELOCITY(FEET/SEC.) =  8.00
   LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30518.00 =   4147.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30518.00 TO NODE  30518.00 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.) =   17.73
   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) =      85.43
   TOTAL STREAM AREA(ACRES) =      85.43
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      158.13

*************************************************************************
   FLOW PROCESS FROM NODE  30510.00 TO NODE  30511.00 IS CODE = 21
-------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=========================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   315.00
   ELEVATION DATA: UPSTREAM(FEET) =     792.00  DOWNSTREAM(FEET) =     690.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.832
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.496
   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
   "CHAPARRAL,NARROWLEAF"    -         1.17       0.30     1.000     0   8.83
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
```

```
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      3.38
   TOTAL AREA(ACRES) =       1.17   PEAK FLOW RATE(CFS) =       3.38


***********************************************************************
   FLOW PROCESS FROM NODE  30511.00 TO NODE  30512.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    690.00  DOWNSTREAM(FEET) =    650.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   182.00   CHANNEL SLOPE = 0.2198
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.403
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        2.22     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) =       6.48
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.08
   AVERAGE FLOW DEPTH(FEET) =   0.55    TRAVEL TIME(MIN.) =   0.43
   Tc(MIN.) =   9.26
   SUBAREA AREA(ACRES) =     2.22      SUBAREA RUNOFF(CFS) =    6.20
   EFFECTIVE AREA(ACRES) =      3.39     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       3.4         PEAK FLOW RATE(CFS) =        9.48

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.64    FLOW VELOCITY(FEET/SEC.) =   7.81
   LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30512.00 =     497.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  30512.00 TO NODE  30513.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   352.00   CHANNEL SLOPE = 0.1136
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.229
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        2.07     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) =       12.21
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.51
   AVERAGE FLOW DEPTH(FEET) =   0.79    TRAVEL TIME(MIN.) =   0.90
   Tc(MIN.) =   10.16
   SUBAREA AREA(ACRES) =     2.07      SUBAREA RUNOFF(CFS) =    5.45
   EFFECTIVE AREA(ACRES) =      5.46     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
```

```
   TOTAL AREA(ACRES) =        5.5       PEAK FLOW RATE(CFS) =       14.40

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.84    FLOW VELOCITY(FEET/SEC.) =   6.77
   LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30513.00 =     849.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30513.00 TO NODE  30514.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =    605.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    49.00   CHANNEL SLOPE = 0.1020
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.209
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        6.01     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) =       22.27
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.28
   AVERAGE FLOW DEPTH(FEET) =   1.01    TRAVEL TIME(MIN.) =   0.11
   Tc(MIN.) =   10.27
   SUBAREA AREA(ACRES) =     6.01      SUBAREA RUNOFF(CFS) =    15.74
   EFFECTIVE AREA(ACRES) =      11.47     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       11.5        PEAK FLOW RATE(CFS) =       30.04

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.13    FLOW VELOCITY(FEET/SEC.) =   7.81
   LONGEST FLOWPATH FROM NODE  30510.00 TO NODE  30514.00 =     898.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30514.00 TO NODE  30515.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    600.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    29.00   CHANNEL SLOPE = 0.1724
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  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
   USER-DEFINED             -        4.23     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) =       35.57
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.91
   AVERAGE FLOW DEPTH(FEET) =   1.09    TRAVEL TIME(MIN.) =   0.05
   Tc(MIN.) =   10.32
   SUBAREA AREA(ACRES) =     4.23      SUBAREA RUNOFF(CFS) =    11.05
```

```
  EFFECTIVE AREA(ACRES) =      15.71     AREA-AVERAGED Fm(INCH/HR) =    0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        15.7       PEAK FLOW RATE(CFS) =       41.00

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.15   FLOW VELOCITY(FEET/SEC.) = 10.35
  LONGEST FLOWPATH FROM NODE 30510.00 TO NODE 30515.00 =     927.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE 30515.00 TO NODE 30516.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    574.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   444.00   CHANNEL SLOPE = 0.0586
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.033
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        6.53     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) =     49.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.19
  AVERAGE FLOW DEPTH(FEET) =   1.51   TRAVEL TIME(MIN.) =   1.03
  Tc(MIN.) =  11.35
  SUBAREA AREA(ACRES) =      6.53      SUBAREA RUNOFF(CFS) =  16.05
  EFFECTIVE AREA(ACRES) =      22.23     AREA-AVERAGED Fm(INCH/HR) =    0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        22.2       PEAK FLOW RATE(CFS) =       54.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.57   FLOW VELOCITY(FEET/SEC.) =  7.41
  LONGEST FLOWPATH FROM NODE 30510.00 TO NODE 30516.00 =    1371.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE 30516.00 TO NODE 30517.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =    519.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1042.00   CHANNEL SLOPE = 0.0528
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.730
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       12.01     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) =     67.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.50
  AVERAGE FLOW DEPTH(FEET) =   1.74   TRAVEL TIME(MIN.) =   2.32
```

```
  Tc(MIN.) =  13.67
  SUBAREA AREA(ACRES) =     12.01      SUBAREA RUNOFF(CFS) =  26.27
  EFFECTIVE AREA(ACRES) =      34.24     AREA-AVERAGED Fm(INCH/HR) =    0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        34.2       PEAK FLOW RATE(CFS) =       74.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.80   FLOW VELOCITY(FEET/SEC.) =  7.68
  LONGEST FLOWPATH FROM NODE 30510.00 TO NODE 30517.00 =    2413.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE 30517.00 TO NODE 30518.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    519.00  DOWNSTREAM(FEET) =    465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1223.00   CHANNEL SLOPE = 0.0442
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.469
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       22.15     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) =     96.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.66
  AVERAGE FLOW DEPTH(FEET) =   2.05   TRAVEL TIME(MIN.) =   2.66
  Tc(MIN.) =  16.33
  SUBAREA AREA(ACRES) =     22.15      SUBAREA RUNOFF(CFS) =  43.23
  EFFECTIVE AREA(ACRES) =      56.39     AREA-AVERAGED Fm(INCH/HR) =    0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        56.4       PEAK FLOW RATE(CFS) =      110.07

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 2.15   FLOW VELOCITY(FEET/SEC.) =  7.91
  LONGEST FLOWPATH FROM NODE 30510.00 TO NODE 30518.00 =    3636.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE 30518.00 TO NODE 30518.00 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.) =  16.33
  RAINFALL INTENSITY(INCH/HR) =   2.47
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      56.39
  TOTAL STREAM AREA(ACRES) =      56.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     110.07

  ** CONFLUENCE DATA **
```

```
STREAM      Q      Tc   Intensity  Fp(Fm)     Ap     Ae    HEADWATER
NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
   1     158.13  17.73   2.357   0.30( 0.30) 1.00    85.4  30500.00
   2     110.07  16.33   2.469   0.30( 0.30) 1.00    56.4  30510.00

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     263.68  16.33   2.469   0.30( 0.30) 1.00   135.1  30510.00
   2     262.51  17.73   2.357   0.30( 0.30) 1.00   141.8  30500.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     263.68    Tc(MIN.) =    16.33
EFFECTIVE AREA(ACRES) =     135.09   AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =      141.8
LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30518.00 =   4147.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  30518.00 TO NODE  30519.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =    448.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   451.00   CHANNEL SLOPE =  0.0377
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.402
  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             -       0.50      0.30     1.000      -
  USER-DEFINED             -       2.40      0.30     0.000      -
  USER-DEFINED             -       2.70      0.30     1.000      -
  USER-DEFINED             -       0.10      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 =  0.671
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    270.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.35
  AVERAGE FLOW DEPTH(FEET) =   3.11    TRAVEL TIME(MIN.) =   0.80
  Tc(MIN.) =   17.13
  SUBAREA AREA(ACRES) =     7.30       SUBAREA RUNOFF(CFS) =  14.46
  EFFECTIVE AREA(ACRES) =    142.39     AREA-AVERAGED Fm(INCH/HR) =   0.29
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.98
  TOTAL AREA(ACRES) =      149.1        PEAK FLOW RATE(CFS) =     270.08

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.10   FLOW VELOCITY(FEET/SEC.) =   9.35
  LONGEST FLOWPATH FROM NODE  30500.00 TO NODE  30519.00 =   4598.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  30519.00 TO NODE  30519.00 IS CODE =  81
```

```
-----------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
  MAINLINE Tc(MIN.) =   17.13
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.402
  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             -       0.10      0.30     1.000      -
  USER-DEFINED             -       2.80      0.30     1.000      -
  USER-DEFINED             -       0.20      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) =    3.80     SUBAREA RUNOFF(CFS) =    7.19
  EFFECTIVE AREA(ACRES) =    146.19   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      152.9     PEAK FLOW RATE(CFS) =    277.27
===========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     152.9  TC(MIN.) =     17.13
  EFFECTIVE AREA(ACRES) =    146.19  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.984
  PEAK FLOW RATE(CFS)   =     277.27

  ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc   Intensity  Fp(Fm)     Ap     Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
     1     277.27  17.13   2.402   0.30( 0.30) 0.98   146.2  30510.00
     2     275.65  18.53   2.298   0.30( 0.30) 0.98   152.9  30500.00
===========================================================================
===========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
  _____
  ****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2013 Advanced Engineering Software (aes)
              Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                     Michael Baker International
                    5 Hutton Centre Drive Suite 500
                         Santa Ana, CA 92707


  *************************** DESCRIPTION OF STUDY ***************************
  * RMV PA-3 WATERSHED 5B EXISTING CONDITION                                *
  * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                   *
  * 100-YEAR EV MARCH 2019 ROKAMOTO                                         *
  **************************************************************************

   FILE NAME: X35B00EV.DAT
   TIME/DATE OF STUDY: 13:03 03/21/2019
  ==========================================================================
   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   60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
   2   50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
   3   40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
   4   30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
   5   20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30530.00 TO NODE  30531.00 IS CODE =  21
  --------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
  ==========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   318.00
   ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   605.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.088
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.440
   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
   "CHAPARRAL,BROADLEAF"     -       0.05    0.30     1.000    0   9.09
   NATURAL FAIR COVER
   "OPEN BRUSH"             -        0.48    0.30     1.000    0   9.09
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =     1.50
   TOTAL AREA(ACRES) =      0.53   PEAK FLOW RATE(CFS) =      1.50

  **************************************************************************
   FLOW PROCESS FROM NODE  30531.00 TO NODE  30532.00 IS CODE = 51
  --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   605.00  DOWNSTREAM(FEET) =   575.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  123.00   CHANNEL SLOPE = 0.2439
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.369
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA     Fp       Ap    SCS
        LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
   USER-DEFINED             -       0.25    0.30     1.000    -
   USER-DEFINED             -       0.62    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) =     2.70
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.03
   AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   0.34
   Tc(MIN.) =    9.43
   SUBAREA AREA(ACRES) =     0.87       SUBAREA RUNOFF(CFS) =    2.40
   EFFECTIVE AREA(ACRES) =     1.40      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      1.4        PEAK FLOW RATE(CFS) =      3.87

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.45   FLOW VELOCITY(FEET/SEC.) =  6.50
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30532.00 =   441.00 FEET.

  **************************************************************************
   FLOW PROCESS FROM NODE  30532.00 TO NODE  30533.00 IS CODE = 51
  --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   575.00  DOWNSTREAM(FEET) =   565.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   67.00   CHANNEL SLOPE = 0.1493
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
```

```
      MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
      * 25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.330
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap       SCS
          LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
      USER-DEFINED               -         0.45      0.30     1.000      -
      USER-DEFINED               -         0.47      0.30     1.000      -
      USER-DEFINED               -         0.01      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) =      5.14
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.77
      AVERAGE FLOW DEPTH(FEET) =  0.54   TRAVEL TIME(MIN.) =  0.19
      Tc(MIN.) =    9.62
      SUBAREA AREA(ACRES) =     0.93      SUBAREA RUNOFF(CFS) =    2.54
      EFFECTIVE AREA(ACRES) =    2.33     AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
      TOTAL AREA(ACRES) =       2.3         PEAK FLOW RATE(CFS) =       6.35

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) = 0.59   FLOW VELOCITY(FEET/SEC.) =  6.08
      LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30533.00 =    508.00 FEET.

**********************************************************************
  FLOW PROCESS FROM NODE  30533.00 TO NODE  30534.00 IS CODE =  51
  ------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  ==================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =    540.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   172.00   CHANNEL SLOPE = 0.1453
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.248
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap       SCS
       LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -         0.01      0.30     1.000      -
   USER-DEFINED               -         0.65      0.30     1.000      -
   USER-DEFINED               -         0.52      0.30     1.000      -
   USER-DEFINED               -         0.36      0.30     1.000      -
   USER-DEFINED               -         0.01      0.30     1.000      -
   USER-DEFINED               -         0.34      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) =      8.86
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.61
   AVERAGE FLOW DEPTH(FEET) =  0.67   TRAVEL TIME(MIN.) =  0.43
   Tc(MIN.) =   10.05
   SUBAREA AREA(ACRES) =     1.89      SUBAREA RUNOFF(CFS) =    5.02
   EFFECTIVE AREA(ACRES) =    4.22     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) =      11.20

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.73   FLOW VELOCITY(FEET/SEC.) =  7.01
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30534.00 =    680.00 FEET.
```

```
***************************************************************************
  FLOW PROCESS FROM NODE  30534.00 TO NODE  30535.00 IS CODE =  51
  -----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  =======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    510.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   302.00   CHANNEL SLOPE = 0.0993
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.115
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap       SCS
       LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -         0.58      0.30     1.000      -
   USER-DEFINED               -         0.16      0.30     1.000      -
   USER-DEFINED               -         0.03      0.30     1.000      -
   USER-DEFINED               -         1.37      0.30     1.000      -
   USER-DEFINED               -         0.22      0.30     1.000      -
   USER-DEFINED               -         0.41      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) =     14.71
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.52
   AVERAGE FLOW DEPTH(FEET) =  0.87   TRAVEL TIME(MIN.) =  0.77
   Tc(MIN.) =   10.83
   SUBAREA AREA(ACRES) =     2.77      SUBAREA RUNOFF(CFS) =    7.02
   EFFECTIVE AREA(ACRES) =    6.99     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       7.0         PEAK FLOW RATE(CFS) =      17.71

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.93   FLOW VELOCITY(FEET/SEC.) =  6.77
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30535.00 =    982.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30535.00 TO NODE  30535.00 IS CODE =  81
  -----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
  =======================================================================
   MAINLINE Tc(MIN.) =   10.83
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.115
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap       SCS
       LAND USE             GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -         0.36      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) =     0.36      SUBAREA RUNOFF(CFS) =    0.91
   EFFECTIVE AREA(ACRES) =    7.35     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       7.3         PEAK FLOW RATE(CFS) =      18.62

***************************************************************************
  FLOW PROCESS FROM NODE  30535.00 TO NODE  30536.00 IS CODE =  51
  -----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    510.00  DOWNSTREAM(FEET) =    490.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  356.00   CHANNEL SLOPE = 0.0562
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.966
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL     AREA       Fp        Ap      SCS
        LAND USE            GROUP      (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -         0.85      0.30     1.000      -
   USER-DEFINED               -         0.32      0.30     1.000      -
   USER-DEFINED               -         0.09      0.30     1.000      -
   USER-DEFINED               -         2.69      0.30     1.000      -
   USER-DEFINED               -         0.84      0.30     1.000      -
   USER-DEFINED               -         1.63      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) =       26.33
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.07
   AVERAGE FLOW DEPTH(FEET) =  1.20    TRAVEL TIME(MIN.) =  0.98
   Tc(MIN.) =  11.80
   SUBAREA AREA(ACRES) =     6.42      SUBAREA RUNOFF(CFS) =   15.41
   EFFECTIVE AREA(ACRES) =      13.77     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      13.8        PEAK FLOW RATE(CFS) =     33.05

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.31   FLOW VELOCITY(FEET/SEC.) =  6.42
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30536.00 =   1338.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  30536.00 TO NODE  30536.00 IS CODE = 81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   11.80
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.966
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL     AREA       Fp        Ap      SCS
        LAND USE            GROUP      (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -         0.45      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) =    0.45       SUBAREA RUNOFF(CFS) =    1.08
   EFFECTIVE AREA(ACRES) =      14.22    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       14.2      PEAK FLOW RATE(CFS) =     34.13

********************************************************************************
   FLOW PROCESS FROM NODE  30536.00 TO NODE  30537.00 IS CODE = 51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    490.00  DOWNSTREAM(FEET) =    455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  556.00   CHANNEL SLOPE = 0.0629
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.795
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL     AREA       Fp        Ap      SCS
        LAND USE            GROUP      (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -         0.49      0.30     1.000      -
   USER-DEFINED               -         2.10      0.30     1.000      -
   USER-DEFINED               -         0.33      0.30     1.000      -
   USER-DEFINED               -         0.39      0.30     1.000      -
   USER-DEFINED               -         3.76      0.30     1.000      -
   USER-DEFINED               -         0.02      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) =       42.09
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.09
   AVERAGE FLOW DEPTH(FEET) =  1.41    TRAVEL TIME(MIN.) =  1.31
   Tc(MIN.) =  13.11
   SUBAREA AREA(ACRES) =     7.09       SUBAREA RUNOFF(CFS) =   15.92
   EFFECTIVE AREA(ACRES) =      21.31     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      21.3        PEAK FLOW RATE(CFS) =     47.86

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.48   FLOW VELOCITY(FEET/SEC.) =  7.33
   LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30537.00 =   1894.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  30537.00 TO NODE  30537.00 IS CODE = 81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   13.11
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.795
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL     AREA       Fp        Ap      SCS
        LAND USE            GROUP      (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -         0.49      0.30     1.000      -
   USER-DEFINED               -         3.83      0.30     1.000      -
   USER-DEFINED               -         0.39      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) =    4.71       SUBAREA RUNOFF(CFS) =   10.58
   EFFECTIVE AREA(ACRES) =      26.02    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       26.0      PEAK FLOW RATE(CFS) =     58.43

********************************************************************************
   FLOW PROCESS FROM NODE  30537.00 TO NODE  30538.00 IS CODE = 51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    417.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  569.00   CHANNEL SLOPE = 0.0668
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.675
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL     AREA       Fp        Ap      SCS
```

```
        LAND USE          GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -        35.49     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) =      96.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.95
  AVERAGE FLOW DEPTH(FEET) =   1.89   TRAVEL TIME(MIN.) =   1.06
  Tc(MIN.) =   14.17
  SUBAREA AREA(ACRES) =    35.49       SUBAREA RUNOFF(CFS) =   75.86
  EFFECTIVE AREA(ACRES) =      61.51    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       61.5       PEAK FLOW RATE(CFS) =     131.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.13   FLOW VELOCITY(FEET/SEC.) =  9.65
  LONGEST FLOWPATH FROM NODE  30530.00 TO NODE  30538.00 =    2463.00 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        61.5  TC(MIN.) =     14.17
  EFFECTIVE AREA(ACRES) =       61.51  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      131.47
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
*************************************************************************
        RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2013 Advanced Engineering Software (aes)
          Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                     Analysis prepared by:

                   Michael Baker International
                  5 Hutton Centre Drive Suite 500
                      Santa Ana, CA 92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 5C EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 100-YR EV  MARCH 2019 ROKAMOTO                                     *
 **********************************************************************

  FILE NAME: X35C00EV.DAT
  TIME/DATE OF STUDY: 13:07 03/21/2019
==========================================================================
  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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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 30550.00 TO NODE 30551.00 IS CODE = 21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
  ELEVATION DATA: UPSTREAM(FEET) =   865.00  DOWNSTREAM(FEET) =   700.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   8.249
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.633
  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
  "CHAPARRAL,BROADLEAF"     -        1.55     0.30     1.000     0   8.25
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =     4.64
  TOTAL AREA(ACRES) =       1.55    PEAK FLOW RATE(CFS) =      4.64

**************************************************************************
  FLOW PROCESS FROM NODE 30551.00 TO NODE 30552.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   685.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   304.00   CHANNEL SLOPE = 0.0493
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.358
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap     SCS
       LAND USE           GROUP     (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -        1.49     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) =     6.69
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.10
  AVERAGE FLOW DEPTH(FEET) =   0.74    TRAVEL TIME(MIN.) =   1.23
  Tc(MIN.) =   9.48
  SUBAREA AREA(ACRES) =     1.49       SUBAREA RUNOFF(CFS) =    4.09
  EFFECTIVE AREA(ACRES) =      3.03       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) =      8.35

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.80    FLOW VELOCITY(FEET/SEC.) =   4.31
  LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30552.00 =     634.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE 30552.00 TO NODE 30553.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   685.00  DOWNSTREAM(FEET) =   650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   84.00   CHANNEL SLOPE = 0.4167
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.331
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
     LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -        3.11    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) =      12.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.63
  AVERAGE FLOW DEPTH(FEET) =  0.63   TRAVEL TIME(MIN.) =   0.13
  Tc(MIN.) =   9.62
  SUBAREA AREA(ACRES) =    3.11      SUBAREA RUNOFF(CFS) =    8.49
  EFFECTIVE AREA(ACRES) =     6.15    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) =      16.77

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.70   FLOW VELOCITY(FEET/SEC.) = 11.50
  LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30553.00 =    718.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30553.00 TO NODE  30554.00 IS CODE =  51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    620.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   370.00   CHANNEL SLOPE =  0.0811
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 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             -        3.21    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) =      20.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.53
  AVERAGE FLOW DEPTH(FEET) =  1.03   TRAVEL TIME(MIN.) =   0.94
  Tc(MIN.) =  10.56
  SUBAREA AREA(ACRES) =    3.21      SUBAREA RUNOFF(CFS) =    8.25
  EFFECTIVE AREA(ACRES) =     9.35    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        9.4       PEAK FLOW RATE(CFS) =      24.07

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.09   FLOW VELOCITY(FEET/SEC.) =  6.80
  LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30554.00 =   1088.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30554.00 TO NODE  30555.00 IS CODE =  51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =    604.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   151.00   CHANNEL SLOPE =  0.1060
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.111
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
     LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -       14.25    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) =      42.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.68
  AVERAGE FLOW DEPTH(FEET) =  1.27   TRAVEL TIME(MIN.) =   0.29
  Tc(MIN.) =  10.85
  SUBAREA AREA(ACRES) =   14.25      SUBAREA RUNOFF(CFS) =   36.05
  EFFECTIVE AREA(ACRES) =    23.60    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       23.6       PEAK FLOW RATE(CFS) =      59.71

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.45   FLOW VELOCITY(FEET/SEC.) =  9.44
  LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30555.00 =   1239.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30555.00 TO NODE  30556.00 IS CODE =  51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    604.00  DOWNSTREAM(FEET) =    543.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1099.00   CHANNEL SLOPE =  0.0555
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.795
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
     LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)   CN
  USER-DEFINED             -       23.90    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) =      86.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.10
  AVERAGE FLOW DEPTH(FEET) =  1.89   TRAVEL TIME(MIN.) =   2.26
  Tc(MIN.) =  13.11
  SUBAREA AREA(ACRES) =   23.90      SUBAREA RUNOFF(CFS) =   53.68
  EFFECTIVE AREA(ACRES) =    47.50    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       47.5       PEAK FLOW RATE(CFS) =     106.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 2.04   FLOW VELOCITY(FEET/SEC.) =  8.55
  LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30556.00 =   2338.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30556.00 TO NODE  30557.00 IS CODE =  51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    543.00  DOWNSTREAM(FEET) =    503.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1074.00   CHANNEL SLOPE =  0.0372
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.550
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         23.19      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) =     130.17
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.74
   AVERAGE FLOW DEPTH(FEET) =  2.37   TRAVEL TIME(MIN.) =  2.31
   Tc(MIN.) =   15.42
   SUBAREA AREA(ACRES) =    23.19      SUBAREA RUNOFF(CFS) =   46.95
   EFFECTIVE AREA(ACRES) =    70.69      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       70.7          PEAK FLOW RATE(CFS) =      143.13

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.45   FLOW VELOCITY(FEET/SEC.) =  7.94
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30557.00 =   3412.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30557.00 TO NODE  30558.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     503.00  DOWNSTREAM(FEET) =     460.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1155.00   CHANNEL SLOPE = 0.0372
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.361
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         59.03      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) =     197.93
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.58
   AVERAGE FLOW DEPTH(FEET) =  2.77   TRAVEL TIME(MIN.) =  2.24
   Tc(MIN.) =   17.67
   SUBAREA AREA(ACRES) =    59.03      SUBAREA RUNOFF(CFS) =  109.51
   EFFECTIVE AREA(ACRES) =    129.73      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      129.7          PEAK FLOW RATE(CFS) =      240.65

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.98   FLOW VELOCITY(FEET/SEC.) =  9.03
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30558.00 =   4567.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30558.00 TO NODE  30559.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =     460.00  DOWNSTREAM(FEET) =     399.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1322.00   CHANNEL SLOPE = 0.0461
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.211
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         45.38      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) =     279.69
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.14
   AVERAGE FLOW DEPTH(FEET) =  3.03   TRAVEL TIME(MIN.) =  2.17
   Tc(MIN.) =   19.84
   SUBAREA AREA(ACRES) =    45.38      SUBAREA RUNOFF(CFS) =   78.06
   EFFECTIVE AREA(ACRES) =    175.11      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      175.1          PEAK FLOW RATE(CFS) =      301.20

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  3.12   FLOW VELOCITY(FEET/SEC.) =  10.34
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30559.00 =   5889.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30559.00 TO NODE  30560.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     399.00  DOWNSTREAM(FEET) =     375.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  373.00   CHANNEL SLOPE = 0.0643
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 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             -         12.10      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) =     311.43
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.82
   AVERAGE FLOW DEPTH(FEET) =  2.96   TRAVEL TIME(MIN.) =  0.53
   Tc(MIN.) =   20.36
   SUBAREA AREA(ACRES) =    12.10      SUBAREA RUNOFF(CFS) =   20.46
   EFFECTIVE AREA(ACRES) =    187.21      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      187.2          PEAK FLOW RATE(CFS) =      316.54

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.98   FLOW VELOCITY(FEET/SEC.) =  11.88
   LONGEST FLOWPATH FROM NODE  30550.00 TO NODE  30560.00 =   6262.00 FEET.
=========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =      187.2  TC(MIN.) =     20.36
   EFFECTIVE AREA(ACRES) =    187.21  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.000
```

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  PEAK FLOW RATE(CFS)   =     316.54
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                      Michael Baker International
                    5 Hutton Centre Drive Suite 500
                         Santa Ana, CA 92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 5D EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 100-YEAR EV MARCH 2019 ROKAMOTO                                    *
 *********************************************************************

  FILE NAME: X35D00EV.DAT
  TIME/DATE OF STUDY: 12:47 03/21/2019
 ================================================================================
  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  60.0    30.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020  0.67  2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30520.00 TO NODE  30521.00 IS CODE =  21
 -------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ================================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   315.00
  ELEVATION DATA: UPSTREAM(FEET) =   866.00  DOWNSTREAM(FEET) =    692.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   7.937
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.713
  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
  "CHAPARRAL,BROADLEAF"    -        1.83     0.30     1.000    0    7.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     5.62
  TOTAL AREA(ACRES) =      1.83   PEAK FLOW RATE(CFS) =      5.62

 *************************************************************************
  FLOW PROCESS FROM NODE  30521.00 TO NODE  30522.00 IS CODE =  51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   692.00  DOWNSTREAM(FEET) =   670.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  148.00   CHANNEL SLOPE = 0.1486
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.613
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap    SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        0.75     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) =       6.73
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.23
  AVERAGE FLOW DEPTH(FEET) =   0.60    TRAVEL TIME(MIN.) =   0.40
  Tc(MIN.) =   8.33
  SUBAREA AREA(ACRES) =     0.75      SUBAREA RUNOFF(CFS) =    2.22
  EFFECTIVE AREA(ACRES) =     2.57      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) =      7.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.63   FLOW VELOCITY(FEET/SEC.) =   6.44
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30522.00 =     463.00 FEET.

 *************************************************************************
  FLOW PROCESS FROM NODE  30522.00 TO NODE  30523.00 IS CODE =  51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   670.00  DOWNSTREAM(FEET) =   654.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  104.00   CHANNEL SLOPE = 0.1538
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 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
 USER-DEFINED             -         1.72      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) =      10.18
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.99
 AVERAGE FLOW DEPTH(FEET) =  0.70   TRAVEL TIME(MIN.) =  0.25
 Tc(MIN.) =   8.58
 SUBAREA AREA(ACRES) =    1.72      SUBAREA RUNOFF(CFS) =   5.02
 EFFECTIVE AREA(ACRES) =     4.29    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        4.3      PEAK FLOW RATE(CFS) =      12.56

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.75   FLOW VELOCITY(FEET/SEC.) =   7.39
 LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30523.00 =    567.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30523.00 TO NODE  30524.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    654.00  DOWNSTREAM(FEET) =    615.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   378.00   CHANNEL SLOPE = 0.1032
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.353
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED            -         3.19      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) =      16.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.81
  AVERAGE FLOW DEPTH(FEET) =  0.91   TRAVEL TIME(MIN.) =  0.93
  Tc(MIN.) =   9.51
  SUBAREA AREA(ACRES) =    3.19      SUBAREA RUNOFF(CFS) =   8.77
  EFFECTIVE AREA(ACRES) =     7.48    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        7.5      PEAK FLOW RATE(CFS) =      20.56

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.98   FLOW VELOCITY(FEET/SEC.) =   7.14
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30524.00 =    945.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30524.00 TO NODE  30525.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    593.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   190.00   CHANNEL SLOPE = 0.1158
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

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 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.278
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED            -         6.94      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) =      29.86
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.20
  AVERAGE FLOW DEPTH(FEET) =  1.10   TRAVEL TIME(MIN.) =  0.39
  Tc(MIN.) =   9.89
  SUBAREA AREA(ACRES) =    6.94      SUBAREA RUNOFF(CFS) =  18.61
  EFFECTIVE AREA(ACRES) =    14.42    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       14.4      PEAK FLOW RATE(CFS) =      38.66

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.22   FLOW VELOCITY(FEET/SEC.) =   8.72
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30525.00 =   1135.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30525.00 TO NODE  30526.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    593.00  DOWNSTREAM(FEET) =    545.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   642.00   CHANNEL SLOPE = 0.0748
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.049
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED            -         9.38      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) =      50.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.92
  AVERAGE FLOW DEPTH(FEET) =  1.45   TRAVEL TIME(MIN.) =  1.35
  Tc(MIN.) =  11.24
  SUBAREA AREA(ACRES) =    9.38      SUBAREA RUNOFF(CFS) =  23.20
  EFFECTIVE AREA(ACRES) =    23.80    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       23.8      PEAK FLOW RATE(CFS) =      58.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.54   FLOW VELOCITY(FEET/SEC.) =   8.23
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30526.00 =   1777.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30526.00 TO NODE  30527.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    483.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1032.00   CHANNEL SLOPE = 0.0601
```

```
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.770
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap     SCS
      LAND USE          GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED               -       21.43      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) =     82.72
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.27
AVERAGE FLOW DEPTH(FEET) = 1.83   TRAVEL TIME(MIN.) =  2.08
Tc(MIN.) =   13.32
SUBAREA AREA(ACRES) =    21.43       SUBAREA RUNOFF(CFS) =   47.63
EFFECTIVE AREA(ACRES) =    45.23     AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       45.2        PEAK FLOW RATE(CFS) =     100.54

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 1.96   FLOW VELOCITY(FEET/SEC.) =  8.69
LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30527.00 =   2809.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30527.00 TO NODE  30528.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    483.00  DOWNSTREAM(FEET) =    456.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   473.00   CHANNEL SLOPE =  0.0571
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.670
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap     SCS
        LAND USE          GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       11.90      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) =    113.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.79
  AVERAGE FLOW DEPTH(FEET) =  2.07   TRAVEL TIME(MIN.) =   0.90
  Tc(MIN.) =   14.22
  SUBAREA AREA(ACRES) =    11.90       SUBAREA RUNOFF(CFS) =   25.38
  EFFECTIVE AREA(ACRES) =    57.13     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       57.1        PEAK FLOW RATE(CFS) =     121.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.13   FLOW VELOCITY(FEET/SEC.) =  8.94
  LONGEST FLOWPATH FROM NODE  30520.00 TO NODE  30528.00 =   3282.00 FEET.
===========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       57.1  TC(MIN.) =    14.22
  EFFECTIVE AREA(ACRES) =     57.13  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =     121.84
===========================================================================
```

```
===========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                      Michael Baker International
                     5 Hutton Centre Drive Suite 500
                          Santa Ana, CA92707


  ************************* DESCRIPTION OF STUDY *************************
* RMV PA-3 WATERSHED 6 EXISTING CONDITION                               *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
* 100-YR EV MARCH 2019 CCHIU                                            *
  *********************************************************************

  FILE NAME: X30600EV.DAT
  TIME/DATE OF STUDY: 11:39 03/27/2019
================================================================================
  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  60.0   30.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  2  50.0   25.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  3  40.0   20.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  4  30.0   15.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150
  5  20.0   10.0    0.020/0.020/0.020  0.67   2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30600.00 TO NODE  30601.00 IS CODE = 21
-------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   328.00
  ELEVATION DATA: UPSTREAM(FEET) =   552.00  DOWNSTREAM(FEET) =    508.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.706
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.135
  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"             -        0.29     0.30     1.000    0  10.71
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.73
  TOTAL AREA(ACRES) =       0.29    PEAK FLOW RATE(CFS) =      0.73

**************************************************************************
  FLOW PROCESS FROM NODE  30601.00 TO NODE  30602.00 IS CODE = 51
-------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   508.00  DOWNSTREAM(FEET) =    480.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  176.00   CHANNEL SLOPE = 0.1591
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.020
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap     SCS
        LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED             -        0.29     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) =    1.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.03
  AVERAGE FLOW DEPTH(FEET) =   0.30    TRAVEL TIME(MIN.) =   0.73
  Tc(MIN.) =   11.43
  SUBAREA AREA(ACRES) =     0.29      SUBAREA RUNOFF(CFS) =    0.72
  EFFECTIVE AREA(ACRES) =      0.58     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         0.6         PEAK FLOW RATE(CFS) =       1.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   FLOW VELOCITY(FEET/SEC.) =   4.32
  LONGEST FLOWPATH FROM NODE  30600.00 TO NODE  30602.00 =     504.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE  30602.00 TO NODE  30603.00 IS CODE = 51
-------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   480.00  DOWNSTREAM(FEET) =    401.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  326.00   CHANNEL SLOPE = 0.2423
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.885
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
        DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
          LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED                 -          0.76      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) =      2.30
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.63
   AVERAGE FLOW DEPTH(FEET) =  0.37   TRAVEL TIME(MIN.) =   0.97
   Tc(MIN.) =   12.40
   SUBAREA AREA(ACRES) =      0.76      SUBAREA RUNOFF(CFS) =    1.76
   EFFECTIVE AREA(ACRES) =      1.34      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) =        3.11

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.41   FLOW VELOCITY(FEET/SEC.) =  6.19
   LONGEST FLOWPATH FROM NODE 30600.00 TO NODE 30603.00 =     830.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30603.00 TO NODE  30604.00 IS CODE = 51
   -----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   =======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    401.00  DOWNSTREAM(FEET) =    385.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  106.00   CHANNEL SLOPE = 0.1509
   CHANNEL BASE(FEET) =   0.00  "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.844
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
          LAND USE         GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -          0.33      0.30      1.000      -
   USER-DEFINED             -          0.62      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) =      4.20
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.58
   AVERAGE FLOW DEPTH(FEET) =  0.50   TRAVEL TIME(MIN.) =   0.32
   Tc(MIN.) =   12.72
   SUBAREA AREA(ACRES) =      0.95      SUBAREA RUNOFF(CFS) =    2.18
   EFFECTIVE AREA(ACRES) =      2.29      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        2.3       PEAK FLOW RATE(CFS) =        5.23

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.55   FLOW VELOCITY(FEET/SEC.) =  5.84
   LONGEST FLOWPATH FROM NODE 30600.00 TO NODE 30604.00 =     936.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE = 81
   -----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
   =======================================================================
   MAINLINE Tc(MIN.) =   12.72
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.844
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
```

```
        LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED               -          1.27      0.30      1.000      -
   USER-DEFINED               -          0.26      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) =    1.53     SUBAREA RUNOFF(CFS) =    3.50
   EFFECTIVE AREA(ACRES) =      3.82    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =        8.74

***************************************************************************
   FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE = 81
   -----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
   =======================================================================
   MAINLINE Tc(MIN.) =   12.72
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.844
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
          LAND USE         GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -          1.01      0.30      1.000      -
   USER-DEFINED             -          0.29      0.30      1.000      -
   USER-DEFINED             -          0.99      0.30      1.000      -
   USER-DEFINED             -          2.11      0.30      1.000      -
   USER-DEFINED             -          1.41      0.30      1.000      -
   USER-DEFINED             -          0.02      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) =    5.83     SUBAREA RUNOFF(CFS) =   13.35
   EFFECTIVE AREA(ACRES) =      9.65    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =       22.09

***************************************************************************
   FLOW PROCESS FROM NODE  30604.00 TO NODE  30604.00 IS CODE = 81
   -----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
   =======================================================================
   MAINLINE Tc(MIN.) =   12.72
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.844
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
          LAND USE         GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -          0.21      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) =    0.21     SUBAREA RUNOFF(CFS) =    0.48
   EFFECTIVE AREA(ACRES) =      9.86    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        9.9       PEAK FLOW RATE(CFS) =       22.57
   =======================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =       9.9  TC(MIN.) =      12.72
   EFFECTIVE AREA(ACRES) =      9.86  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)    =      22.57
   =======================================================================
   =======================================================================
```

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 **************************
 * RMV PA-3 WATERSHED 7 EXISTING CONDITION                                  *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                    *
 * 100-YR EV  MARCH 2019 ROKAMOTO                                           *
  *************************************************************************

   FILE NAME: X30700EV.DAT
   TIME/DATE OF STUDY: 13:26 03/21/2019
 ============================================================================
   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   60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150
  2   50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150
  3   40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150
  4   30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150
  5   20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167  0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30700.00 TO NODE  30701.00 IS CODE =  21
 ----------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ============================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
   ELEVATION DATA: UPSTREAM(FEET) =   760.00  DOWNSTREAM(FEET) =    600.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.225
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.640
   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
   "CHAPARRAL,BROADLEAF"     -       1.30     0.30     1.000     98   8.22
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =     3.92
   TOTAL AREA(ACRES) =       1.30    PEAK FLOW RATE(CFS) =      3.92

 *****************************************************************************
   FLOW PROCESS FROM NODE  30701.00 TO NODE  30702.00 IS CODE =  51
 ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    545.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   378.00   CHANNEL SLOPE = 0.1455
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.411
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
         LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        2.43     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) =       7.32
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.30
   AVERAGE FLOW DEPTH(FEET) =   0.62    TRAVEL TIME(MIN.) =   1.00
   Tc(MIN.) =   9.23
   SUBAREA AREA(ACRES) =    2.43       SUBAREA RUNOFF(CFS) =    6.81
   EFFECTIVE AREA(ACRES) =      3.74     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        3.7        PEAK FLOW RATE(CFS) =     10.46

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.71   FLOW VELOCITY(FEET/SEC.) =  6.87
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30702.00 =    703.00 FEET.

 *****************************************************************************
   FLOW PROCESS FROM NODE  30702.00 TO NODE  30703.00 IS CODE =  51
 ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    539.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    71.00   CHANNEL SLOPE = 0.0845
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.370
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -         2.09     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) =     13.34
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.95
 AVERAGE FLOW DEPTH(FEET) = 0.86   TRAVEL TIME(MIN.) =  0.20
 Tc(MIN.) =  9.42
 SUBAREA AREA(ACRES) =    2.09      SUBAREA RUNOFF(CFS) =   5.78
 EFFECTIVE AREA(ACRES) =    5.83    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) =     16.10

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.93   FLOW VELOCITY(FEET/SEC.) =  6.26
 LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30703.00 =   774.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30703.00 TO NODE  30704.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    539.00  DOWNSTREAM(FEET) =    509.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  317.00   CHANNEL SLOPE = 0.0946
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.222
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -         2.46     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) =     19.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.82
  AVERAGE FLOW DEPTH(FEET) = 0.97   TRAVEL TIME(MIN.) =  0.77
  Tc(MIN.) =  10.20
  SUBAREA AREA(ACRES) =    2.46      SUBAREA RUNOFF(CFS) =   6.48
  EFFECTIVE AREA(ACRES) =    8.29    AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =      8.3      PEAK FLOW RATE(CFS) =     21.80

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.02   FLOW VELOCITY(FEET/SEC.) =  7.02
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30704.00 =  1091.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30704.00 TO NODE  30705.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    509.00  DOWNSTREAM(FEET) =    484.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  294.00   CHANNEL SLOPE = 0.0850
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.104
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -         2.96     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) =     25.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.02
  AVERAGE FLOW DEPTH(FEET) = 1.10   TRAVEL TIME(MIN.) =  0.70
  Tc(MIN.) =  10.90
  SUBAREA AREA(ACRES) =    2.96      SUBAREA RUNOFF(CFS) =   7.48
  EFFECTIVE AREA(ACRES) =    11.25    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) =     28.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.15   FLOW VELOCITY(FEET/SEC.) =  7.19
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30705.00 =  1385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30705.00 TO NODE  30706.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    484.00  DOWNSTREAM(FEET) =    464.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  257.00   CHANNEL SLOPE = 0.0778
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.015
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
       LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED             -         7.40     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) =     37.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.47
  AVERAGE FLOW DEPTH(FEET) = 1.29   TRAVEL TIME(MIN.) =  0.57
  Tc(MIN.) =  11.47
  SUBAREA AREA(ACRES) =    7.40      SUBAREA RUNOFF(CFS) =   18.09
  EFFECTIVE AREA(ACRES) =    18.66    AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
  TOTAL AREA(ACRES) =      18.7      PEAK FLOW RATE(CFS) =     45.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.39   FLOW VELOCITY(FEET/SEC.) =  7.85
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30706.00 =  1642.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30706.00 TO NODE  30707.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    464.00  DOWNSTREAM(FEET) =    455.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  147.00   CHANNEL SLOPE = 0.0612
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.967
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap     SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         7.29      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) =     54.33
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.50
   AVERAGE FLOW DEPTH(FEET) =  1.55   TRAVEL TIME(MIN.) =  0.33
   Tc(MIN.) =   11.80
   SUBAREA AREA(ACRES) =      7.29      SUBAREA RUNOFF(CFS) =  17.49
   EFFECTIVE AREA(ACRES) =     25.94     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       25.9        PEAK FLOW RATE(CFS) =    62.28

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.64   FLOW VELOCITY(FEET/SEC.) =  7.76
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30707.00 =   1789.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30707.00 TO NODE  30708.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =     432.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   461.00   CHANNEL SLOPE = 0.0499
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.829
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap     SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         5.94      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) =     69.04
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.37
   AVERAGE FLOW DEPTH(FEET) =  1.77   TRAVEL TIME(MIN.) =  1.04
   Tc(MIN.) =   12.84
   SUBAREA AREA(ACRES) =      5.94      SUBAREA RUNOFF(CFS) =  13.53
   EFFECTIVE AREA(ACRES) =     31.89     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       31.9        PEAK FLOW RATE(CFS) =    72.56

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.80   FLOW VELOCITY(FEET/SEC.) =  7.48
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30708.00 =   2250.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  30708.00 TO NODE  30709.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    432.00  DOWNSTREAM(FEET) =     422.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE = 0.0588
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.787
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap     SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        13.07      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) =     87.19
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.29
   AVERAGE FLOW DEPTH(FEET) =  1.87   TRAVEL TIME(MIN.) =  0.34
   Tc(MIN.) =   13.18
   SUBAREA AREA(ACRES) =     13.07      SUBAREA RUNOFF(CFS) =  29.25
   EFFECTIVE AREA(ACRES) =     44.95     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       45.0        PEAK FLOW RATE(CFS) =    100.62

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.97   FLOW VELOCITY(FEET/SEC.) =  8.61
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30709.00 =   2420.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  30709.00 TO NODE  30710.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    422.00  DOWNSTREAM(FEET) =     377.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1074.00   CHANNEL SLOPE = 0.0419
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.549
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap     SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        19.46      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) =    120.32
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.94
   AVERAGE FLOW DEPTH(FEET) =  2.25   TRAVEL TIME(MIN.) =  2.26
   Tc(MIN.) =   15.44
   SUBAREA AREA(ACRES) =     19.46      SUBAREA RUNOFF(CFS) =  39.38
   EFFECTIVE AREA(ACRES) =     64.41     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       64.4        PEAK FLOW RATE(CFS) =    130.36

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.32   FLOW VELOCITY(FEET/SEC.) =  8.10
   LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30710.00 =   3494.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  30710.00 TO NODE  30711.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    377.00  DOWNSTREAM(FEET) =    345.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   546.00   CHANNEL SLOPE = 0.0586
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.478
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp         Ap       SCS
      LAND USE             GROUP    (ACRES)   (INCH/HR)  (DECIMAL)   CN
  USER-DEFINED               -        9.60      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) =    139.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.60
  AVERAGE FLOW DEPTH(FEET) =   2.00   TRAVEL TIME(MIN.) =   0.78
  Tc(MIN.) =   16.22
  SUBAREA AREA(ACRES) =     9.60        SUBAREA RUNOFF(CFS) =   18.82
  EFFECTIVE AREA(ACRES) =     74.01     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       74.0        PEAK FLOW RATE(CFS) =    145.09

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.03   FLOW VELOCITY(FEET/SEC.) = 11.71
  LONGEST FLOWPATH FROM NODE  30700.00 TO NODE  30711.00 =   4040.00 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       74.0  TC(MIN.) =    16.22
  EFFECTIVE AREA(ACRES) =     74.01  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =      145.09
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
****************************************************************************
           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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              Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                      Analysis prepared by:

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                     Santa Ana, CA 92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 8 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 100-YR EV  MARCH 2019 ROKAMOTO                                       *
 **********************************************************************

   FILE NAME: X30800EV.DAT
   TIME/DATE OF STUDY: 13:28 03/21/2019
 =========================================================================
   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  60.0   30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0   25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0   20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0   15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0   10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30800.00 TO NODE  30801.00 IS CODE =  21
 --------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   324.00
   ELEVATION DATA: UPSTREAM(FEET) =   646.00  DOWNSTREAM(FEET) =    573.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.604
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.334
   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
   "CHAPARRAL,BROADLEAF"     -       0.69     0.30     1.000    98   9.60
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =     1.87
   TOTAL AREA(ACRES) =       0.69    PEAK FLOW RATE(CFS) =      1.87

 ****************************************************************************
   FLOW PROCESS FROM NODE  30801.00 TO NODE  30802.00 IS CODE =  51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   573.00  DOWNSTREAM(FEET) =    538.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  104.00   CHANNEL SLOPE = 0.3365
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.287
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap    SCS
        LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
   USER-DEFINED              -       1.06     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) =     3.30
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.10
   AVERAGE FLOW DEPTH(FEET) =   0.39    TRAVEL TIME(MIN.) =   0.24
   Tc(MIN.) =   9.85
   SUBAREA AREA(ACRES) =      1.06       SUBAREA RUNOFF(CFS) =    2.86
   EFFECTIVE AREA(ACRES) =      1.75      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        1.8        PEAK FLOW RATE(CFS) =     4.70

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.45   FLOW VELOCITY(FEET/SEC.) =  7.64
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30802.00 =    428.00 FEET.

 ****************************************************************************
   FLOW PROCESS FROM NODE  30802.00 TO NODE  30803.00 IS CODE =  51
 --------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   538.00  DOWNSTREAM(FEET) =    500.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  166.00   CHANNEL SLOPE = 0.2289
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.218
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
 USER-DEFINED             -       1.89     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) =      7.19
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.44
 AVERAGE FLOW DEPTH(FEET) = 0.57   TRAVEL TIME(MIN.) =  0.37
 Tc(MIN.) =  10.22
 SUBAREA AREA(ACRES) =    1.89     SUBAREA RUNOFF(CFS) =   4.97
 EFFECTIVE AREA(ACRES) =     3.64    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) =      9.57

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.63   FLOW VELOCITY(FEET/SEC.) =  8.02
 LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30803.00 =    594.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30803.00 TO NODE  30804.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    447.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   284.00   CHANNEL SLOPE = 0.1866
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.120
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
 USER-DEFINED             -       3.78     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) =     14.37
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.17
 AVERAGE FLOW DEPTH(FEET) = 0.77   TRAVEL TIME(MIN.) =  0.58
 Tc(MIN.) =  10.80
 SUBAREA AREA(ACRES) =    3.78     SUBAREA RUNOFF(CFS) =   9.60
 EFFECTIVE AREA(ACRES) =     7.43    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       7.4       PEAK FLOW RATE(CFS) =     18.84

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.85   FLOW VELOCITY(FEET/SEC.) =  8.70
 LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30804.00 =    878.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30804.00 TO NODE  30805.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    447.00  DOWNSTREAM(FEET) =    438.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   101.00   CHANNEL SLOPE = 0.0891
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.081
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
 USER-DEFINED             -       4.22     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) =     24.13
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 7.01
 AVERAGE FLOW DEPTH(FEET) = 1.07   TRAVEL TIME(MIN.) =  0.24
 Tc(MIN.) =  11.04
 SUBAREA AREA(ACRES) =    4.22     SUBAREA RUNOFF(CFS) =  10.57
 EFFECTIVE AREA(ACRES) =    11.65    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      11.7       PEAK FLOW RATE(CFS) =     29.16

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.15   FLOW VELOCITY(FEET/SEC.) =  7.39
 LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30805.00 =    979.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30805.00 TO NODE  30806.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    438.00  DOWNSTREAM(FEET) =    419.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   418.00   CHANNEL SLOPE = 0.0455
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.914
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/     SCS SOIL   AREA      Fp        Ap     SCS
      LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
 USER-DEFINED             -       7.15     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) =     37.58
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.11
 AVERAGE FLOW DEPTH(FEET) = 1.43   TRAVEL TIME(MIN.) =  1.14
 Tc(MIN.) =  12.18
 SUBAREA AREA(ACRES) =    7.15     SUBAREA RUNOFF(CFS) =  16.83
 EFFECTIVE AREA(ACRES) =    18.80    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      18.8       PEAK FLOW RATE(CFS) =     44.25

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.52   FLOW VELOCITY(FEET/SEC.) =  6.37
 LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30806.00 =   1397.00 FEET.

***************************************************************************
  FLOW PROCESS FROM NODE  30806.00 TO NODE  30807.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    419.00  DOWNSTREAM(FEET) =    395.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   499.00   CHANNEL SLOPE = 0.0481
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.762
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -        9.75      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) =      55.05
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.86
   AVERAGE FLOW DEPTH(FEET) =  1.64   TRAVEL TIME(MIN.) =   1.21
   Tc(MIN.) =   13.39
   SUBAREA AREA(ACRES) =      9.75      SUBAREA RUNOFF(CFS) =   21.61
   EFFECTIVE AREA(ACRES) =     28.56      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       28.6        PEAK FLOW RATE(CFS) =       63.28

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.72   FLOW VELOCITY(FEET/SEC.) =  7.12
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30807.00 =   1896.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30807.00 TO NODE  30808.00 IS CODE = 51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    395.00  DOWNSTREAM(FEET) =    358.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   698.00   CHANNEL SLOPE =  0.0530
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 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
   USER-DEFINED               -       10.78      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) =      74.43
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.69
   AVERAGE FLOW DEPTH(FEET) =  1.80   TRAVEL TIME(MIN.) =   1.51
   Tc(MIN.) =   14.90
   SUBAREA AREA(ACRES) =     10.78      SUBAREA RUNOFF(CFS) =   22.30
   EFFECTIVE AREA(ACRES) =     39.33      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       39.3        PEAK FLOW RATE(CFS) =       81.41

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.86   FLOW VELOCITY(FEET/SEC.) =  7.85
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30808.00 =   2594.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  30808.00 TO NODE  30809.00 IS CODE = 51
   ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =    332.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   102.00   CHANNEL SLOPE =  0.2549
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.590
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -       10.00      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) =      91.72
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 18.09
   AVERAGE FLOW DEPTH(FEET) =  1.30   TRAVEL TIME(MIN.) =   0.09
   Tc(MIN.) =   15.00
   SUBAREA AREA(ACRES) =     10.00      SUBAREA RUNOFF(CFS) =   20.61
   EFFECTIVE AREA(ACRES) =     49.33      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       49.3        PEAK FLOW RATE(CFS) =      101.70

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.35   FLOW VELOCITY(FEET/SEC.) = 18.51
   LONGEST FLOWPATH FROM NODE  30800.00 TO NODE  30809.00 =   2696.00 FEET.
   ========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =        49.3   TC(MIN.) =     15.00
   EFFECTIVE AREA(ACRES) =     49.33  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)   =      101.70
   ========================================================================
   ========================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
_____
*************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                         Analysis prepared by:




 *************************** DESCRIPTION OF STUDY ***************************
 * RMV PA-3 WATERSHED 9A EXISTING CONDITION                                *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                   *
 * 100-YR EV  AUGUST 2017 ROKAMOTO                                         *
 *************************************************************************

  FILE NAME: 0610309Y.DAT
  TIME/DATE OF STUDY: 11:10 08/01/2017
=========================================================================
  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   60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2   50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3   40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4   30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5   20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30900.00 TO NODE  30901.00 IS CODE =  21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   325.00
  ELEVATION DATA: UPSTREAM(FEET) =    558.00  DOWNSTREAM(FEET) =    510.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.464
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.176
  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  10.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =     1.55
  TOTAL AREA(ACRES) =      0.60   PEAK FLOW RATE(CFS) =     1.55

*************************************************************************
  FLOW PROCESS FROM NODE  30901.00 TO NODE  30902.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    510.00  DOWNSTREAM(FEET) =    470.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  107.00   CHANNEL SLOPE = 0.3738
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.133
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp       Ap    SCS
        LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        1.02     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) =      2.85
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.98
  AVERAGE FLOW DEPTH(FEET) =   0.37   TRAVEL TIME(MIN.) =   0.26
  Tc(MIN.) =   10.72
  SUBAREA AREA(ACRES) =     1.02       SUBAREA RUNOFF(CFS) =    2.61
  EFFECTIVE AREA(ACRES) =     1.62      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       1.6        PEAK FLOW RATE(CFS) =     4.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   FLOW VELOCITY(FEET/SEC.) =   7.72
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30902.00 =    432.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  30902.00 TO NODE  30903.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    445.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  126.00   CHANNEL SLOPE = 0.1984
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.082
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
  DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -         1.53     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) =        6.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.75
  AVERAGE FLOW DEPTH(FEET) =  0.55   TRAVEL TIME(MIN.) =  0.31
  Tc(MIN.) =   11.03
  SUBAREA AREA(ACRES) =     1.53       SUBAREA RUNOFF(CFS) =    3.83
  EFFECTIVE AREA(ACRES) =     3.15     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) =      7.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.61   FLOW VELOCITY(FEET/SEC.) =  7.17
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30903.00 =    558.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30903.00 TO NODE  30904.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    445.00  DOWNSTREAM(FEET) =    404.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    252.00   CHANNEL SLOPE =  0.1627
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.995
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -         3.07     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) =       11.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.31
  AVERAGE FLOW DEPTH(FEET) =  0.73   TRAVEL TIME(MIN.) =  0.57
  Tc(MIN.) =   11.61
  SUBAREA AREA(ACRES) =     3.07       SUBAREA RUNOFF(CFS) =    7.43
  EFFECTIVE AREA(ACRES) =     6.22     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        6.2       PEAK FLOW RATE(CFS) =     15.08

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.80   FLOW VELOCITY(FEET/SEC.) =  7.89
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30904.00 =    810.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30904.00 TO NODE  30905.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    404.00  DOWNSTREAM(FEET) =    356.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    544.00   CHANNEL SLOPE =  0.0882
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.815
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -         4.76     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) =       20.47
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.77
  AVERAGE FLOW DEPTH(FEET) =  1.00   TRAVEL TIME(MIN.) =  1.34
  Tc(MIN.) =   12.95
  SUBAREA AREA(ACRES) =     4.76       SUBAREA RUNOFF(CFS) =   10.78
  EFFECTIVE AREA(ACRES) =    10.98     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       11.0       PEAK FLOW RATE(CFS) =     24.85

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.08   FLOW VELOCITY(FEET/SEC.) =  7.10
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30905.00 =   1354.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30905.00 TO NODE  30906.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    356.00  DOWNSTREAM(FEET) =    332.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    335.00   CHANNEL SLOPE =  0.0716
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 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
  USER-DEFINED             -        12.78     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) =       38.80
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.31
  AVERAGE FLOW DEPTH(FEET) =  1.33   TRAVEL TIME(MIN.) =  0.76
  Tc(MIN.) =   13.71
  SUBAREA AREA(ACRES) =    12.78       SUBAREA RUNOFF(CFS) =   27.90
  EFFECTIVE AREA(ACRES) =    23.76     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       23.8       PEAK FLOW RATE(CFS) =     51.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.48   FLOW VELOCITY(FEET/SEC.) =  7.86
  LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30906.00 =   1689.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  30906.00 TO NODE  30907.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    332.00  DOWNSTREAM(FEET) =    305.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    447.00   CHANNEL SLOPE =  0.0604
```

```
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.641
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
     LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED               -        2.24     0.30      1.000     -
USER-DEFINED               -        0.01     0.30      1.000     -
USER-DEFINED               -        0.76     0.30      1.000     -
USER-DEFINED               -        0.48     0.30      1.000     -
USER-DEFINED               -        2.47     0.30      1.000     -
USER-DEFINED               -        2.72     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) =      61.01
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.54
AVERAGE FLOW DEPTH(FEET) =   1.46   TRAVEL TIME(MIN.) =   0.78
Tc(MIN.) =   14.49
SUBAREA AREA(ACRES) =      8.68       SUBAREA RUNOFF(CFS) =   18.29
EFFECTIVE AREA(ACRES) =      32.44     AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =       32.4        PEAK FLOW RATE(CFS) =      68.36

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.52   FLOW VELOCITY(FEET/SEC.) =   9.82
LONGEST FLOWPATH FROM NODE  30900.00 TO NODE  30907.00 =    2136.00 FEET.
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =        32.4  TC(MIN.) =     14.49
EFFECTIVE AREA(ACRES) =      32.44  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)   =       68.36
================================================================================
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

                       Michael Baker International
                      5 Hutton Centre Drive Suite 500
                         Santa Ana, CA 92707


 ************************** DESCRIPTION OF STUDY **************************
* RMV PA-3 WATERSHED 9B EXISTING CONDITION                              *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
* 100-YR EV  MARCH 2019 ROKAMOTO                                        *
 ***********************************************************************

  FILE NAME: X39B00EV.DAT
  TIME/DATE OF STUDY: 13:36 03/21/2019
===============================================================================
  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  60.0    30.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167  0.0150
  2  50.0    25.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167  0.0150
  3  40.0    20.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167  0.0150
  4  30.0    15.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167  0.0150
  5  20.0    10.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167  0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  30910.00 TO NODE  30911.00 IS CODE = 21
--------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
  ELEVATION DATA: UPSTREAM(FEET) =    479.00  DOWNSTREAM(FEET) =    428.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.414
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.184
  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
  "GRASS"                   -        0.34     0.30     1.000   98   10.41
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =       0.34   PEAK FLOW RATE(CFS) =       0.88

****************************************************************************
  FLOW PROCESS FROM NODE  30911.00 TO NODE  30912.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   428.00  DOWNSTREAM(FEET) =    380.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   91.00   CHANNEL SLOPE = 0.5275
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.149
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -        0.87     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) =     1.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.35
  AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =   0.21
  Tc(MIN.) =   10.62
  SUBAREA AREA(ACRES) =      0.87      SUBAREA RUNOFF(CFS) =    2.22
  EFFECTIVE AREA(ACRES) =      1.20      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       3.09

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   8.22
  LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30912.00 =    420.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30912.00 TO NODE  30913.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   380.00  DOWNSTREAM(FEET) =    372.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   91.00   CHANNEL SLOPE = 0.0879
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.094
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
 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
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.48
 AVERAGE FLOW DEPTH(FEET) =  0.55   TRAVEL TIME(MIN.) =  0.34
 Tc(MIN.) =  10.96
 SUBAREA AREA(ACRES) =     0.80      SUBAREA RUNOFF(CFS) =    2.02
 EFFECTIVE AREA(ACRES) =     2.01     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       2.0       PEAK FLOW RATE(CFS) =      5.05

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.60   FLOW VELOCITY(FEET/SEC.) =  4.71
 LONGEST FLOWPATH FROM NODE 30910.00 TO NODE 30913.00 =   511.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30913.00 TO NODE  30914.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =    355.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  111.00   CHANNEL SLOPE = 0.1532
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  25 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
  USER-DEFINED            -         1.30     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) =      6.66
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.21
 AVERAGE FLOW DEPTH(FEET) =  0.60   TRAVEL TIME(MIN.) =  0.30
 Tc(MIN.) =  11.26
 SUBAREA AREA(ACRES) =     1.30      SUBAREA RUNOFF(CFS) =    3.22
 EFFECTIVE AREA(ACRES) =     3.31     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       3.3       PEAK FLOW RATE(CFS) =      8.19

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.64   FLOW VELOCITY(FEET/SEC.) =  6.59
 LONGEST FLOWPATH FROM NODE 30910.00 TO NODE 30914.00 =   622.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30914.00 TO NODE  30915.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    340.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  236.00   CHANNEL SLOPE = 0.0636
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.934
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
      LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED            -         1.86     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) =     10.39
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.04
 AVERAGE FLOW DEPTH(FEET) =  0.83   TRAVEL TIME(MIN.) =  0.78
 Tc(MIN.) =  12.04
 SUBAREA AREA(ACRES) =     1.86      SUBAREA RUNOFF(CFS) =    4.40
 EFFECTIVE AREA(ACRES) =     5.17     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       5.2       PEAK FLOW RATE(CFS) =     12.25

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.88   FLOW VELOCITY(FEET/SEC.) =  5.25
 LONGEST FLOWPATH FROM NODE 30910.00 TO NODE 30915.00 =   858.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30915.00 TO NODE  30916.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    340.00  DOWNSTREAM(FEET) =    317.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  366.00   CHANNEL SLOPE = 0.0628
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  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            -         2.39     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) =     14.93
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.50
 AVERAGE FLOW DEPTH(FEET) =  0.95   TRAVEL TIME(MIN.) =  1.11
 Tc(MIN.) =  13.14
 SUBAREA AREA(ACRES) =     2.39      SUBAREA RUNOFF(CFS) =    5.35
 EFFECTIVE AREA(ACRES) =     7.56     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       7.6       PEAK FLOW RATE(CFS) =     16.94

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.00   FLOW VELOCITY(FEET/SEC.) =  5.69
 LONGEST FLOWPATH FROM NODE 30910.00 TO NODE 30916.00 =  1224.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  30916.00 TO NODE  30917.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    317.00  DOWNSTREAM(FEET) =    295.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  346.00   CHANNEL SLOPE = 0.0636
```

```
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.683
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) =       21.98
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.04
AVERAGE FLOW DEPTH(FEET) =   1.10   TRAVEL TIME(MIN.) =   0.95
Tc(MIN.) =   14.10
SUBAREA AREA(ACRES) =     4.70      SUBAREA RUNOFF(CFS) =   10.08
EFFECTIVE AREA(ACRES) =     12.26     AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =      12.3         PEAK FLOW RATE(CFS) =      26.28

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.18   FLOW VELOCITY(FEET/SEC.) =   6.32
LONGEST FLOWPATH FROM NODE  30910.00 TO NODE  30917.00 =    1570.00 FEET.
===============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =        12.3  TC(MIN.) =       14.10
EFFECTIVE AREA(ACRES) =     12.26  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)    =        26.28
===============================================================================
===============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

                        Michael Baker International
                      5 Hutton Centre Drive Suite 500
                          Santa Ana, CA 92707


  ************************* DESCRIPTION OF STUDY *************************
* RMV PA-3 WATERSHED 10 EXISTING CONDITION                             *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
* 100-YR EV  MARCH 2019 ROKAMOTO                                       *
  *********************************************************************

  FILE NAME: X31000EV.DAT
  TIME/DATE OF STUDY: 13:39 03/21/2019
========================================================================
  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  60.0    30.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31000.00 TO NODE  31001.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
  ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM(FEET) =   455.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.457
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.363
  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
  "GRASS"                   -       0.99     0.30     1.000    98   9.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.73
  TOTAL AREA(ACRES) =       0.99   PEAK FLOW RATE(CFS) =      2.73

*************************************************************************
  FLOW PROCESS FROM NODE  31001.00 TO NODE  31002.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    430.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  222.00   CHANNEL SLOPE = 0.1126
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.224
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap    SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -       1.27     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) =     4.41
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.06
  AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   0.73
  Tc(MIN.) =   10.19
  SUBAREA AREA(ACRES) =     1.27       SUBAREA RUNOFF(CFS) =    3.35
  EFFECTIVE AREA(ACRES) =     2.26      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       2.3        PEAK FLOW RATE(CFS) =      5.96

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.61   FLOW VELOCITY(FEET/SEC.) =   5.42
  LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31002.00 =    542.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31002.00 TO NODE  31003.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    430.00  DOWNSTREAM(FEET) =    422.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  159.00   CHANNEL SLOPE = 0.0503
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.118
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap       SCS
       LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         1.34      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) =       7.66
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.27
   AVERAGE FLOW DEPTH(FEET) =   0.77   TRAVEL TIME(MIN.) =   0.62
   Tc(MIN.) =   10.81
   SUBAREA AREA(ACRES) =     1.34      SUBAREA RUNOFF(CFS) =    3.41
   EFFECTIVE AREA(ACRES) =      3.61     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) =        9.15

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.83   FLOW VELOCITY(FEET/SEC.) =   4.46
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31003.00 =    701.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31003.00 TO NODE  31004.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   422.00  DOWNSTREAM(FEET) =    379.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   506.00   CHANNEL SLOPE = 0.0850
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 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
   USER-DEFINED              -         2.88      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) =      12.57
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.29
   AVERAGE FLOW DEPTH(FEET) =   0.76   TRAVEL TIME(MIN.) =   1.16
   Tc(MIN.) =   11.97
   SUBAREA AREA(ACRES) =     2.88      SUBAREA RUNOFF(CFS) =    6.84
   EFFECTIVE AREA(ACRES) =      6.48     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) =       15.42

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.82   FLOW VELOCITY(FEET/SEC.) =   7.66
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31004.00 =   1207.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31004.00 TO NODE  31005.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   379.00  DOWNSTREAM(FEET) =    365.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   357.00   CHANNEL SLOPE = 0.0392
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
```

```
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.814
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap       SCS
       LAND USE            GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED              -         2.59      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) =      18.35
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.00
   AVERAGE FLOW DEPTH(FEET) =   1.01   TRAVEL TIME(MIN.) =   0.99
   Tc(MIN.) =   12.96
   SUBAREA AREA(ACRES) =     2.59      SUBAREA RUNOFF(CFS) =    5.86
   EFFECTIVE AREA(ACRES) =      9.07     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        9.1       PEAK FLOW RATE(CFS) =       20.52

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.05   FLOW VELOCITY(FEET/SEC.) =   6.21
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31005.00 =   1564.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31005.00 TO NODE  31006.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   365.00  DOWNSTREAM(FEET) =    334.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   696.00   CHANNEL SLOPE = 0.0445
   CHANNEL BASE(FEET) =   0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   * 25 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              -         5.86      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) =      26.66
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.91
   AVERAGE FLOW DEPTH(FEET) =   1.13   TRAVEL TIME(MIN.) =   1.68
   Tc(MIN.) =   14.64
   SUBAREA AREA(ACRES) =     5.86      SUBAREA RUNOFF(CFS) =   12.27
   EFFECTIVE AREA(ACRES) =     14.93     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       14.9       PEAK FLOW RATE(CFS) =       31.26

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.20   FLOW VELOCITY(FEET/SEC.) =   7.21
   LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31006.00 =   2260.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31006.00 TO NODE  31007.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   334.00  DOWNSTREAM(FEET) =    327.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   175.00   CHANNEL SLOPE = 0.0400
```

```
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.591
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap    SCS
     LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
USER-DEFINED              -        33.75     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) =      66.07
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.31
AVERAGE FLOW DEPTH(FEET) =   1.63   TRAVEL TIME(MIN.) =   0.35
Tc(MIN.) =   14.99
SUBAREA AREA(ACRES) =    33.75      SUBAREA RUNOFF(CFS) =   69.61
EFFECTIVE AREA(ACRES) =    48.68      AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =        48.7        PEAK FLOW RATE(CFS) =      100.40

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.90   FLOW VELOCITY(FEET/SEC.) =   9.25
LONGEST FLOWPATH FROM NODE  31000.00 TO NODE  31007.00 =    2435.00 FEET.
==============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =        48.7  TC(MIN.) =       14.99
EFFECTIVE AREA(ACRES) =       48.68  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)    =       100.40
==============================================================================
==============================================================================
END OF RATIONAL METHOD ANALYSIS
```

```
_____
****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2013 Advanced Engineering Software (aes)
             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                     Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA 92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 11 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 100-YR EV  MARCH 2019 ROKAMOTO                                     *
 *********************************************************************

   FILE NAME: X31100EV.DAT
   TIME/DATE OF STUDY: 13:48 03/21/2019
===========================================================================
   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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31100.00 TO NODE  31101.00 IS CODE = 21
---------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===========================================================================
```

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```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
   ELEVATION DATA: UPSTREAM(FEET) =    532.00  DOWNSTREAM(FEET) =    475.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.054
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.248
   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"              -       0.34     0.30     1.000     98  10.05
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =      0.91
   TOTAL AREA(ACRES) =       0.34   PEAK FLOW RATE(CFS) =      0.91

****************************************************************************
  FLOW PROCESS FROM NODE  31101.00 TO NODE  31102.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    475.00  DOWNSTREAM(FEET) =    455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   133.00   CHANNEL SLOPE = 0.1504
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 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              -       0.47     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) =    1.52
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.24
   AVERAGE FLOW DEPTH(FEET) =   0.35   TRAVEL TIME(MIN.) =   0.52
   Tc(MIN.) =   10.58
   SUBAREA AREA(ACRES) =     0.47      SUBAREA RUNOFF(CFS) =    1.22
   EFFECTIVE AREA(ACRES) =      0.82     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         0.8        PEAK FLOW RATE(CFS) =     2.11

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.39   FLOW VELOCITY(FEET/SEC.) =   4.70
   LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31102.00 =    455.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31102.00 TO NODE  31103.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    415.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   238.00   CHANNEL SLOPE = 0.1681
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.035
   SUBAREA LOSS RATE DATA(AMC  II):
```

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```
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
     LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       0.58     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) =      2.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.22
  AVERAGE FLOW DEPTH(FEET) =  0.42   TRAVEL TIME(MIN.) =  0.76
  Tc(MIN.) =   11.34
  SUBAREA AREA(ACRES) =    0.58      SUBAREA RUNOFF(CFS) =   1.43
  EFFECTIVE AREA(ACRES) =    1.40    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       1.4      PEAK FLOW RATE(CFS) =      3.45

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   FLOW VELOCITY(FEET/SEC.) =  5.55
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31103.00 =    693.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31103.00 TO NODE  31104.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    415.00  DOWNSTREAM(FEET) =    379.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   394.00   CHANNEL SLOPE = 0.0914
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.883
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
     LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       1.61     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) =      5.32
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.11
  AVERAGE FLOW DEPTH(FEET) =  0.54   TRAVEL TIME(MIN.) =  1.07
  Tc(MIN.) =   12.41
  SUBAREA AREA(ACRES) =    1.61      SUBAREA RUNOFF(CFS) =   3.75
  EFFECTIVE AREA(ACRES) =    3.01    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) =      7.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.60   FLOW VELOCITY(FEET/SEC.) =  6.49
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31104.00 =   1087.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31104.00 TO NODE  31105.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    379.00  DOWNSTREAM(FEET) =    359.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   388.00   CHANNEL SLOPE = 0.0515
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.753
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
     LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       5.30     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) =     12.85
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.13
  AVERAGE FLOW DEPTH(FEET) =  0.84   TRAVEL TIME(MIN.) =  1.06
  Tc(MIN.) =   13.47
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =  11.69
  EFFECTIVE AREA(ACRES) =    8.31    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       8.3      PEAK FLOW RATE(CFS) =     18.35

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.96   FLOW VELOCITY(FEET/SEC.) =  6.66
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31105.00 =   1475.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31105.00 TO NODE  31106.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    359.00  DOWNSTREAM(FEET) =    345.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   316.00   CHANNEL SLOPE = 0.0443
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.664
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap     SCS
     LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       2.41     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) =     20.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.51
  AVERAGE FLOW DEPTH(FEET) =  1.03   TRAVEL TIME(MIN.) =  0.81
  Tc(MIN.) =   14.28
  SUBAREA AREA(ACRES) =    2.41      SUBAREA RUNOFF(CFS) =   5.14
  EFFECTIVE AREA(ACRES) =   10.72    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      10.7      PEAK FLOW RATE(CFS) =     22.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.07   FLOW VELOCITY(FEET/SEC.) =  6.63
  LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31106.00 =   1791.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31106.00 TO NODE  31107.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    345.00  DOWNSTREAM(FEET) =    336.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE = 0.0265
```

```
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
    *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.570
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
     USER-DEFINED              -        11.64      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) =     34.70
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.09
    AVERAGE FLOW DEPTH(FEET) =  1.38   TRAVEL TIME(MIN.) =  0.93
    Tc(MIN.) =  15.21
    SUBAREA AREA(ACRES) =   11.64      SUBAREA RUNOFF(CFS) =   23.77
    EFFECTIVE AREA(ACRES) =    22.36     AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =      22.4         PEAK FLOW RATE(CFS) =     45.69

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.53   FLOW VELOCITY(FEET/SEC.) =  6.50
    LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31107.00 =    2131.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31107.00 TO NODE  31108.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    336.00  DOWNSTREAM(FEET) =    325.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   488.00   CHANNEL SLOPE = 0.0225
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
    *  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              -         5.13      0.30     0.939     -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.939
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     50.70
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.30
    AVERAGE FLOW DEPTH(FEET) =  1.64   TRAVEL TIME(MIN.) =  1.29
    Tc(MIN.) =  16.50
    SUBAREA AREA(ACRES) =    5.13      SUBAREA RUNOFF(CFS) =   10.03
    EFFECTIVE AREA(ACRES) =    27.49     AREA-AVERAGED Fm(INCH/HR) =  0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  0.99
    TOTAL AREA(ACRES) =      27.5         PEAK FLOW RATE(CFS) =     53.38

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.67   FLOW VELOCITY(FEET/SEC.) =  6.35
    LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31108.00 =    2619.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31108.00 TO NODE  31109.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
```

```
    ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =    275.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   731.00   CHANNEL SLOPE = 0.0684
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.336
    SUBAREA LOSS RATE DATA(AMC  II):
     DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
     USER-DEFINED              -        10.26      0.30     0.934     -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.934
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     62.88
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.12
    AVERAGE FLOW DEPTH(FEET) =  1.61   TRAVEL TIME(MIN.) =  1.50
    Tc(MIN.) =  18.00
    SUBAREA AREA(ACRES) =   10.26      SUBAREA RUNOFF(CFS) =   18.98
    EFFECTIVE AREA(ACRES) =    37.75     AREA-AVERAGED Fm(INCH/HR) =  0.29
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  0.97
    TOTAL AREA(ACRES) =      37.7         PEAK FLOW RATE(CFS) =     69.45

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  1.67   FLOW VELOCITY(FEET/SEC.) =  8.32
    LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31109.00 =    3350.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31109.00 TO NODE  31110.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    275.00  DOWNSTREAM(FEET) =    261.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   641.00   CHANNEL SLOPE = 0.0218
    CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
    *  25 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              -        15.10      0.30     0.985     -
    SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
    SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.985
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     82.45
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.67
    AVERAGE FLOW DEPTH(FEET) =  2.20   TRAVEL TIME(MIN.) =  1.88
    Tc(MIN.) =  19.88
    SUBAREA AREA(ACRES) =   15.10      SUBAREA RUNOFF(CFS) =   26.00
    EFFECTIVE AREA(ACRES) =    52.85     AREA-AVERAGED Fm(INCH/HR) =  0.29
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  0.98
    TOTAL AREA(ACRES) =      52.8         PEAK FLOW RATE(CFS) =     91.09

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  2.29   FLOW VELOCITY(FEET/SEC.) =  5.81
    LONGEST FLOWPATH FROM NODE  31100.00 TO NODE  31110.00 =    3991.00 FEET.
==========================================================================
END OF STUDY SUMMARY:
    TOTAL AREA(ACRES)     =        52.8  TC(MIN.) =     19.88
    EFFECTIVE AREA(ACRES) =    52.85  AREA-AVERAGED Fm(INCH/HR)=  0.29
    AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap = 0.977
```

```
  PEAK FLOW RATE(CFS)   =      91.09
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
****************************************************************************
         RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                     Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA 92707


 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 12 EXISTING CONDITION                               *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 100-YR EV  MARCH 2019 ROKAMOTO                                         *
 **************************************************************************

  FILE NAME: X31200EV.DAT
  TIME/DATE OF STUDY: 14:43 03/21/2019
========================================================================
  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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth =  0.00 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  31200.00 TO NODE  31201.00 IS CODE =  21
 --------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
  ELEVATION DATA: UPSTREAM(FEET) =   761.00  DOWNSTREAM(FEET) =    639.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.619
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.544
  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"              -        0.91     0.30    1.000   98   8.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     2.65
  TOTAL AREA(ACRES) =       0.91   PEAK FLOW RATE(CFS) =      2.65

****************************************************************************
  FLOW PROCESS FROM NODE  31201.00 TO NODE  31202.00 IS CODE =  51
 --------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   639.00  DOWNSTREAM(FEET) =    595.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  219.00   CHANNEL SLOPE = 0.2009
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.412
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA     Fp       Ap    SCS
       LAND USE           GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -        0.97     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) =     4.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.09
  AVERAGE FLOW DEPTH(FEET) =   0.47   TRAVEL TIME(MIN.) =   0.60
  Tc(MIN.) =   9.22
  SUBAREA AREA(ACRES) =     0.97      SUBAREA RUNOFF(CFS) =    2.71
  EFFECTIVE AREA(ACRES) =      1.88     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.9        PEAK FLOW RATE(CFS) =      5.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.52   FLOW VELOCITY(FEET/SEC.) =   6.58
  LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31202.00 =     540.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31202.00 TO NODE  31203.00 IS CODE =  51
 --------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   595.00  DOWNSTREAM(FEET) =    589.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   50.00   CHANNEL SLOPE = 0.1200
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.384
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp        Ap      SCS
      LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -        2.51      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) =       8.73
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.12
 AVERAGE FLOW DEPTH(FEET) =  0.69   TRAVEL TIME(MIN.) =   0.14
 Tc(MIN.) =   9.35
 SUBAREA AREA(ACRES) =     2.51      SUBAREA RUNOFF(CFS) =    6.96
 EFFECTIVE AREA(ACRES) =     4.38    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        4.4      PEAK FLOW RATE(CFS) =      12.17

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.78   FLOW VELOCITY(FEET/SEC.) =  6.65
 LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31203.00 =    590.00 FEET.

********************************************************************************
 FLOW PROCESS FROM NODE  31203.00 TO NODE  31204.00 IS CODE = 51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    589.00  DOWNSTREAM(FEET) =    560.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   308.00   CHANNEL SLOPE = 0.0942
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.236
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp        Ap      SCS
      LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -        4.19      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) =      17.70
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.66
 AVERAGE FLOW DEPTH(FEET) =  0.94   TRAVEL TIME(MIN.) =   0.77
 Tc(MIN.) =  10.12
 SUBAREA AREA(ACRES) =     4.19      SUBAREA RUNOFF(CFS) =   11.07
 EFFECTIVE AREA(ACRES) =     8.57    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) =      22.65

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.03   FLOW VELOCITY(FEET/SEC.) =  7.08
 LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31204.00 =    898.00 FEET.

********************************************************************************
 FLOW PROCESS FROM NODE  31204.00 TO NODE  31205.00 IS CODE = 51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    560.00  DOWNSTREAM(FEET) =    537.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   457.00   CHANNEL SLOPE = 0.0503
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.031
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp        Ap      SCS
      LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -        8.19      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) =      32.72
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.14
 AVERAGE FLOW DEPTH(FEET) =  1.33   TRAVEL TIME(MIN.) =   1.24
 Tc(MIN.) =  11.36
 SUBAREA AREA(ACRES) =     8.19      SUBAREA RUNOFF(CFS) =   20.13
 EFFECTIVE AREA(ACRES) =    16.76    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       16.8      PEAK FLOW RATE(CFS) =      41.21

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.45   FLOW VELOCITY(FEET/SEC.) =  6.51
 LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31205.00 =   1355.00 FEET.

********************************************************************************
 FLOW PROCESS FROM NODE  31205.00 TO NODE  31206.00 IS CODE = 51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    537.00  DOWNSTREAM(FEET) =    479.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   780.00   CHANNEL SLOPE = 0.0744
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.815
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp        Ap      SCS
      LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -       15.47      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) =      58.73
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.21
 AVERAGE FLOW DEPTH(FEET) =  1.54   TRAVEL TIME(MIN.) =   1.58
 Tc(MIN.) =  12.95
 SUBAREA AREA(ACRES) =    15.47      SUBAREA RUNOFF(CFS) =   35.03
 EFFECTIVE AREA(ACRES) =    32.24    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       32.2      PEAK FLOW RATE(CFS) =      72.98

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.67   FLOW VELOCITY(FEET/SEC.) =  8.68
 LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31206.00 =   2135.00 FEET.

********************************************************************************
 FLOW PROCESS FROM NODE  31206.00 TO NODE  31207.00 IS CODE = 51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    479.00  DOWNSTREAM(FEET) =    455.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   551.00   CHANNEL SLOPE = 0.0436
```

```
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.682
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
           LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
     USER-DEFINED             -        37.81      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) =    113.52
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.93
     AVERAGE FLOW DEPTH(FEET) =  2.18   TRAVEL TIME(MIN.) =  1.16
     Tc(MIN.) =   14.11
     SUBAREA AREA(ACRES) =    37.81      SUBAREA RUNOFF(CFS) =   81.06
     EFFECTIVE AREA(ACRES) =     70.05     AREA-AVERAGED Fm(INCH/HR) =  0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =       70.1          PEAK FLOW RATE(CFS) =     150.17

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 2.42   FLOW VELOCITY(FEET/SEC.) =  8.52
     LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31207.00 =   2686.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31207.00 TO NODE  31208.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
     ELEVATION DATA: UPSTREAM(FEET) =    455.00  DOWNSTREAM(FEET) =    434.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =   743.00   CHANNEL SLOPE = 0.0283
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.518
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
           LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
     USER-DEFINED             -        18.18      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) =    168.33
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.45
     AVERAGE FLOW DEPTH(FEET) =  2.74   TRAVEL TIME(MIN.) =  1.66
     Tc(MIN.) =   15.77
     SUBAREA AREA(ACRES) =    18.18      SUBAREA RUNOFF(CFS) =   36.30
     EFFECTIVE AREA(ACRES) =     88.23     AREA-AVERAGED Fm(INCH/HR) =  0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =       88.2          PEAK FLOW RATE(CFS) =     176.15

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 2.79   FLOW VELOCITY(FEET/SEC.) =  7.55
     LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31208.00 =   3429.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31208.00 TO NODE  31209.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
```

```
     ELEVATION DATA: UPSTREAM(FEET) =    434.00  DOWNSTREAM(FEET) =    410.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =   899.00   CHANNEL SLOPE = 0.0267
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.359
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
           LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
     USER-DEFINED             -        42.09      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) =    215.15
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.75
     AVERAGE FLOW DEPTH(FEET) =  3.04   TRAVEL TIME(MIN.) =  1.93
     Tc(MIN.) =   17.70
     SUBAREA AREA(ACRES) =    42.09      SUBAREA RUNOFF(CFS) =   77.98
     EFFECTIVE AREA(ACRES) =    130.32     AREA-AVERAGED Fm(INCH/HR) =  0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =      130.3          PEAK FLOW RATE(CFS) =     241.46

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 3.18   FLOW VELOCITY(FEET/SEC.) =  7.98
     LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31209.00 =   4328.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31209.00 TO NODE  31210.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
     ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    390.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =   724.00   CHANNEL SLOPE = 0.0276
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
     *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.255
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
           LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
     USER-DEFINED             -        27.15      0.30      0.999     -
     SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
     SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.999
     TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    265.36
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.27
     AVERAGE FLOW DEPTH(FEET) =  3.27   TRAVEL TIME(MIN.) =  1.46
     Tc(MIN.) =   19.16
     SUBAREA AREA(ACRES) =    27.15      SUBAREA RUNOFF(CFS) =   47.79
     EFFECTIVE AREA(ACRES) =    157.48     AREA-AVERAGED Fm(INCH/HR) =  0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =      157.5          PEAK FLOW RATE(CFS) =     277.12

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 3.32   FLOW VELOCITY(FEET/SEC.) =  8.36
     LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31210.00 =   5052.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31210.00 TO NODE  31211.00 IS CODE = 51
-----------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    390.00  DOWNSTREAM(FEET) =    364.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1073.00   CHANNEL SLOPE = 0.0242
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.119
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL   AREA      Fp        Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -       15.95     0.30      0.963    -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.963
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    290.27
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.05
   AVERAGE FLOW DEPTH(FEET) = 3.47   TRAVEL TIME(MIN.) =   2.22
   Tc(MIN.) =   21.38
   SUBAREA AREA(ACRES) =    15.95       SUBAREA RUNOFF(CFS) =   26.28
   EFFECTIVE AREA(ACRES) =    173.43     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =     173.4        PEAK FLOW RATE(CFS) =    284.16

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.44   FLOW VELOCITY(FEET/SEC.) =   8.01
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31211.00 =   6125.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  31211.00 TO NODE  31212.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    364.00  DOWNSTREAM(FEET) =    318.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1175.00   CHANNEL SLOPE = 0.0391
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.018
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL   AREA      Fp        Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -       81.12     0.30      0.928    -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.928
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    347.67
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.08
   AVERAGE FLOW DEPTH(FEET) = 3.39   TRAVEL TIME(MIN.) =   1.94
   Tc(MIN.) =   23.32
   SUBAREA AREA(ACRES) =    81.12       SUBAREA RUNOFF(CFS) =  126.99
   EFFECTIVE AREA(ACRES) =    254.55     AREA-AVERAGED Fm(INCH/HR) =   0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.97
   TOTAL AREA(ACRES) =     254.5        PEAK FLOW RATE(CFS) =    395.26

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.56   FLOW VELOCITY(FEET/SEC.) =  10.41
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31212.00 =   7300.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  31212.00 TO NODE  31213.00 IS CODE = 51
```

```
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    318.00  DOWNSTREAM(FEET) =    317.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  506.00   CHANNEL SLOPE = 0.0020
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.907
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL   AREA      Fp        Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        1.00     0.30      0.850    -
   USER-DEFINED               -       28.30     0.30      1.000    -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.995
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    416.47
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.44
   AVERAGE FLOW DEPTH(FEET) = 6.35   TRAVEL TIME(MIN.) =   2.45
   Tc(MIN.) =   25.77
   SUBAREA AREA(ACRES) =    29.30       SUBAREA RUNOFF(CFS) =   42.41
   EFFECTIVE AREA(ACRES) =    283.85     AREA-AVERAGED Fm(INCH/HR) =   0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.98
   TOTAL AREA(ACRES) =     283.8        PEAK FLOW RATE(CFS) =    412.27

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 6.32   FLOW VELOCITY(FEET/SEC.) =   3.44
   LONGEST FLOWPATH FROM NODE  31200.00 TO NODE  31213.00 =   7806.00 FEET.
==============================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)       =     283.8  TC(MIN.) =    25.77
   EFFECTIVE AREA(ACRES) =    283.85  AREA-AVERAGED Fm(INCH/HR)=  0.29
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.977
   PEAK FLOW RATE(CFS)     =     412.27
==============================================================================
==============================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
_____
*************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2013 Advanced Engineering Software (aes)
            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                     Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA 92707


 *************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 13 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                 *
 * 100-YR EV  MARCH 2019 ROKAMOTO                                        *
 *************************************************************************

  FILE NAME: X31300EV.DAT
  TIME/DATE OF STUDY: 14:51 03/21/2019
 ========================================================================
  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  60.0    30.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31300.00 TO NODE  31301.00 IS CODE =  21
 ------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
  ELEVATION DATA: UPSTREAM(FEET) =   535.00  DOWNSTREAM(FEET) =   490.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.423
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.183
  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
  "GRASS"                   -        0.53     0.30     1.000   98  10.42
  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) =       0.53   PEAK FLOW RATE(CFS) =       1.37

 *************************************************************************
  FLOW PROCESS FROM NODE  31301.00 TO NODE  31302.00 IS CODE =  51
 ------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =   480.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   134.00   CHANNEL SLOPE = 0.0746
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.086
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap   SCS
        LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        1.00     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) =      2.62
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.83
  AVERAGE FLOW DEPTH(FEET) =   0.48   TRAVEL TIME(MIN.) =   0.58
  Tc(MIN.) =   11.01
  SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    2.51
  EFFECTIVE AREA(ACRES) =      1.53      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       3.83

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.55   FLOW VELOCITY(FEET/SEC.) =   4.16
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31302.00 =    450.00 FEET.

 *************************************************************************
  FLOW PROCESS FROM NODE  31302.00 TO NODE  31303.00 IS CODE =  51
 ------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   480.00  DOWNSTREAM(FEET) =   469.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   237.00   CHANNEL SLOPE = 0.0464
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.935
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/        SCS SOIL    AREA       Fp         Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -         1.63      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) =      5.77
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 3.85
 AVERAGE FLOW DEPTH(FEET) =  0.71   TRAVEL TIME(MIN.) =   1.03
 Tc(MIN.) =   12.03
 SUBAREA AREA(ACRES) =     1.63      SUBAREA RUNOFF(CFS) =    3.87
 EFFECTIVE AREA(ACRES) =      3.16    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) =       7.50

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.78   FLOW VELOCITY(FEET/SEC.) =   4.10
 LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31303.00 =    687.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31303.00 TO NODE  31304.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    469.00  DOWNSTREAM(FEET) =    418.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    483.00   CHANNEL SLOPE = 0.1056
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.768
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         3.16      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) =     11.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.14
  AVERAGE FLOW DEPTH(FEET) =  0.77   TRAVEL TIME(MIN.) =   1.31
  Tc(MIN.) =   13.34
  SUBAREA AREA(ACRES) =     3.16      SUBAREA RUNOFF(CFS) =    7.02
  EFFECTIVE AREA(ACRES) =      6.32    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        6.3       PEAK FLOW RATE(CFS) =      14.05

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.84   FLOW VELOCITY(FEET/SEC.) =   6.57
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31304.00 =   1170.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31304.00 TO NODE  31305.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    418.00  DOWNSTREAM(FEET) =    381.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    469.00   CHANNEL SLOPE = 0.0789
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.641
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        10.56      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) =     25.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.80
  AVERAGE FLOW DEPTH(FEET) =  1.11   TRAVEL TIME(MIN.) =   1.15
  Tc(MIN.) =   14.49
  SUBAREA AREA(ACRES) =    10.56      SUBAREA RUNOFF(CFS) =   22.25
  EFFECTIVE AREA(ACRES) =     16.88    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       16.9       PEAK FLOW RATE(CFS) =      35.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.26   FLOW VELOCITY(FEET/SEC.) =   7.43
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31305.00 =   1639.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31305.00 TO NODE  31306.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    381.00  DOWNSTREAM(FEET) =    363.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    398.00   CHANNEL SLOPE = 0.0452
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.562
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        19.15      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) =     55.08
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.33
  AVERAGE FLOW DEPTH(FEET) =  1.48   TRAVEL TIME(MIN.) =   0.80
  Tc(MIN.) =   15.29
  SUBAREA AREA(ACRES) =    19.15      SUBAREA RUNOFF(CFS) =   38.99
  EFFECTIVE AREA(ACRES) =     36.03    AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       36.0       PEAK FLOW RATE(CFS) =      73.37

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.65   FLOW VELOCITY(FEET/SEC.) =   8.95
  LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31306.00 =   2037.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31306.00 TO NODE  31307.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    363.00  DOWNSTREAM(FEET) =    313.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    836.00   CHANNEL SLOPE = 0.0598
```

```
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.443
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        13.40      0.30      0.998     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.998
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     86.30
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.36
   AVERAGE FLOW DEPTH(FEET) = 1.67    TRAVEL TIME(MIN.) =  1.34
   Tc(MIN.) =   16.63
   SUBAREA AREA(ACRES) =    13.40      SUBAREA RUNOFF(CFS) =   25.84
   EFFECTIVE AREA(ACRES) =     49.43     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      49.4         PEAK FLOW RATE(CFS) =      95.35

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.73   FLOW VELOCITY(FEET/SEC.) = 10.63
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31307.00 =   2873.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31307.00 TO NODE  31308.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    313.00  DOWNSTREAM(FEET) =    302.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  763.00   CHANNEL SLOPE = 0.0144
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.292
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        11.99      0.30      0.998     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.998
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    106.10
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.39
   AVERAGE FLOW DEPTH(FEET) = 2.35    TRAVEL TIME(MIN.) =  1.99
   Tc(MIN.) =   18.62
   SUBAREA AREA(ACRES) =    11.99      SUBAREA RUNOFF(CFS) =   21.51
   EFFECTIVE AREA(ACRES) =     61.43     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      61.4         PEAK FLOW RATE(CFS) =     110.12

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.39   FLOW VELOCITY(FEET/SEC.) = 6.45
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31308.00 =   3636.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31308.00 TO NODE  31309.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    302.00  DOWNSTREAM(FEET) =    289.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1009.00   CHANNEL SLOPE = 0.0129
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.127
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        21.83      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) =    128.07
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.43
   AVERAGE FLOW DEPTH(FEET) = 2.58    TRAVEL TIME(MIN.) =  2.61
   Tc(MIN.) =   21.24
   SUBAREA AREA(ACRES) =    21.83      SUBAREA RUNOFF(CFS) =   35.90
   EFFECTIVE AREA(ACRES) =     83.25     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      83.3         PEAK FLOW RATE(CFS) =     136.95

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.64   FLOW VELOCITY(FEET/SEC.) = 6.54
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31309.00 =   4645.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31309.00 TO NODE  31310.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    289.00  DOWNSTREAM(FEET) =    275.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  628.00   CHANNEL SLOPE = 0.0223
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.060
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        37.10      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) =    166.33
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.42
   AVERAGE FLOW DEPTH(FEET) = 2.57    TRAVEL TIME(MIN.) =  1.24
   Tc(MIN.) =   22.48
   SUBAREA AREA(ACRES) =    37.10      SUBAREA RUNOFF(CFS) =   58.77
   EFFECTIVE AREA(ACRES) =    120.35     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     120.4         PEAK FLOW RATE(CFS) =     190.67

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.70   FLOW VELOCITY(FEET/SEC.) = 8.73
   LONGEST FLOWPATH FROM NODE  31300.00 TO NODE  31310.00 =   5273.00 FEET.
=========================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)    =      120.4  TC(MIN.) =     22.48
EFFECTIVE AREA(ACRES) =    120.35  AREA-AVERAGED Fm(INCH/HR)= 0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
```

```
  PEAK FLOW RATE(CFS)   =     190.67
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                     Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA 92707


  ************************* DESCRIPTION OF STUDY *************************
  * RMV PA-3 WATERSHED 14 EXISTING CONDITION                           *
  * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
  * 100-YR EV  MARCH 2019 ROKAMOTO                                     *
  *********************************************************************

   FILE NAME: X31400EV.DAT
   TIME/DATE OF STUDY: 14:56 03/21/2019
 ========================================================================
   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   60.0     30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   2   50.0     25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   3   40.0     20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   4   30.0     15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   5   20.0     10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31400.00 TO NODE  31401.00 IS CODE =  21
 -----------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =======================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =    327.00
   ELEVATION DATA: UPSTREAM(FEET) =    868.00  DOWNSTREAM(FEET) =    772.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.143
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.428
   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
   "CHAPARRAL,NARROWLEAF"     -        0.99      0.30     1.000    98   9.14
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =      2.78
   TOTAL AREA(ACRES) =       0.99   PEAK FLOW RATE(CFS) =       2.78

 *************************************************************************
   FLOW PROCESS FROM NODE  31401.00 TO NODE  31402.00 IS CODE =  51
 -----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    772.00  DOWNSTREAM(FEET) =    750.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    134.00   CHANNEL SLOPE = 0.1642
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.349
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp       Ap    SCS
         LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL) CN
   USER-DEFINED               -        1.23      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) =     4.47
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.81
   AVERAGE FLOW DEPTH(FEET) =    0.51    TRAVEL TIME(MIN.) =    0.38
   Tc(MIN.) =    9.53
   SUBAREA AREA(ACRES) =     1.23       SUBAREA RUNOFF(CFS) =     3.36
   EFFECTIVE AREA(ACRES) =      2.21     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =      6.08

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.57   FLOW VELOCITY(FEET/SEC.) =   6.29
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31402.00 =    461.00 FEET.

 *************************************************************************
   FLOW PROCESS FROM NODE  31402.00 TO NODE  31403.00 IS CODE =  51
 -----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    750.00  DOWNSTREAM(FEET) =    710.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    318.00   CHANNEL SLOPE = 0.1258
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.187
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         1.42      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) =       7.93
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.08
   AVERAGE FLOW DEPTH(FEET) =  0.66   TRAVEL TIME(MIN.) =   0.87
   Tc(MIN.) =   10.40
   SUBAREA AREA(ACRES) =     1.42       SUBAREA RUNOFF(CFS) =    3.69
   EFFECTIVE AREA(ACRES) =      3.64     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) =       9.45

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.70   FLOW VELOCITY(FEET/SEC.) =  6.34
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31403.00 =     779.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  31403.00 TO NODE  31404.00 IS CODE =  51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    710.00  DOWNSTREAM(FEET) =     688.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   181.00   CHANNEL SLOPE =  0.1215
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.111
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         1.91      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) =      11.86
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.61
   AVERAGE FLOW DEPTH(FEET) =  0.77   TRAVEL TIME(MIN.) =   0.46
   Tc(MIN.) =   10.85
   SUBAREA AREA(ACRES) =     1.91       SUBAREA RUNOFF(CFS) =    4.83
   EFFECTIVE AREA(ACRES) =      5.55     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        5.5        PEAK FLOW RATE(CFS) =      14.03

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.82   FLOW VELOCITY(FEET/SEC.) =  6.93
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31404.00 =     960.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  31404.00 TO NODE  31405.00 IS CODE =  51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    688.00  DOWNSTREAM(FEET) =     675.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   237.00   CHANNEL SLOPE =  0.0549
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
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   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.998
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         2.67      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) =      17.27
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  5.40
   AVERAGE FLOW DEPTH(FEET) =  1.03   TRAVEL TIME(MIN.) =   0.73
   Tc(MIN.) =   11.59
   SUBAREA AREA(ACRES) =     2.67       SUBAREA RUNOFF(CFS) =    6.48
   EFFECTIVE AREA(ACRES) =      8.21     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        8.2        PEAK FLOW RATE(CFS) =      19.94

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.09   FLOW VELOCITY(FEET/SEC.) =  5.61
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31405.00 =    1197.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  31405.00 TO NODE  31406.00 IS CODE =  51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =     668.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    78.00   CHANNEL SLOPE =  0.0897
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.972
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap       SCS
       LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -         7.51      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) =      28.98
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.41
   AVERAGE FLOW DEPTH(FEET) =  1.14   TRAVEL TIME(MIN.) =   0.18
   Tc(MIN.) =   11.76
   SUBAREA AREA(ACRES) =     7.51       SUBAREA RUNOFF(CFS) =   18.07
   EFFECTIVE AREA(ACRES) =     15.73     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       15.7        PEAK FLOW RATE(CFS) =      37.83

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.26   FLOW VELOCITY(FEET/SEC.) =  7.90
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31406.00 =    1275.00 FEET.

**************************************************************************
   FLOW PROCESS FROM NODE  31406.00 TO NODE  31407.00 IS CODE =  51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    668.00  DOWNSTREAM(FEET) =     640.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0502
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   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.792
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -        9.79      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) =     48.81
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.76
   AVERAGE FLOW DEPTH(FEET) = 1.55   TRAVEL TIME(MIN.) =  1.38
   Tc(MIN.) =  13.14
   SUBAREA AREA(ACRES) =      9.79      SUBAREA RUNOFF(CFS) =   21.96
   EFFECTIVE AREA(ACRES) =     25.52      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      25.5          PEAK FLOW RATE(CFS) =     57.23

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.65   FLOW VELOCITY(FEET/SEC.) =  7.05
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31407.00 =   1833.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31407.00 TO NODE  31408.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     640.00  DOWNSTREAM(FEET) =      607.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    710.00   CHANNEL SLOPE = 0.0465
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  25 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               -       18.46      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) =     76.47
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.38
   AVERAGE FLOW DEPTH(FEET) = 1.86   TRAVEL TIME(MIN.) =  1.60
   Tc(MIN.) =  14.74
   SUBAREA AREA(ACRES) =     18.46      SUBAREA RUNOFF(CFS) =   38.47
   EFFECTIVE AREA(ACRES) =     43.97      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      44.0          PEAK FLOW RATE(CFS) =     91.65

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.99   FLOW VELOCITY(FEET/SEC.) =  7.73
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31408.00 =   2543.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31408.00 TO NODE  31409.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
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   ELEVATION DATA: UPSTREAM(FEET) =     607.00  DOWNSTREAM(FEET) =      574.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    674.00   CHANNEL SLOPE = 0.0490
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.485
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -        9.15      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) =    100.66
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.05
   AVERAGE FLOW DEPTH(FEET) = 2.04   TRAVEL TIME(MIN.) =  1.40
   Tc(MIN.) =  16.14
   SUBAREA AREA(ACRES) =      9.15      SUBAREA RUNOFF(CFS) =   18.00
   EFFECTIVE AREA(ACRES) =     53.13      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      53.1          PEAK FLOW RATE(CFS) =     104.49

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.07   FLOW VELOCITY(FEET/SEC.) =  8.13
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31409.00 =   3217.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31409.00 TO NODE  31410.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     574.00  DOWNSTREAM(FEET) =      540.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    817.00   CHANNEL SLOPE = 0.0416
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.355
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE             GROUP    (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED               -       54.88      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) =    155.24
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.44
   AVERAGE FLOW DEPTH(FEET) = 2.48   TRAVEL TIME(MIN.) =  1.61
   Tc(MIN.) =  17.75
   SUBAREA AREA(ACRES) =     54.88      SUBAREA RUNOFF(CFS) =  101.48
   EFFECTIVE AREA(ACRES) =    108.01      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      108.0          PEAK FLOW RATE(CFS) =     199.73

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.72   FLOW VELOCITY(FEET/SEC.) =  8.99
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31410.00 =   4034.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31410.00 TO NODE  31411.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
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   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    540.00  DOWNSTREAM(FEET) =    500.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1364.00   CHANNEL SLOPE = 0.0293
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.169
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)   (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        40.22      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) =    233.56
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.21
   AVERAGE FLOW DEPTH(FEET) =  3.08   TRAVEL TIME(MIN.) =  2.77
   Tc(MIN.) =  20.52
   SUBAREA AREA(ACRES) =    40.22      SUBAREA RUNOFF(CFS) =  67.66
   EFFECTIVE AREA(ACRES) =    148.22     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     148.2       PEAK FLOW RATE(CFS) =    249.36

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.16   FLOW VELOCITY(FEET/SEC.) =  8.32
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31411.00 =   5398.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31411.00 TO NODE  31412.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    468.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  985.00   CHANNEL SLOPE = 0.0325
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.070
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)   (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -       100.09      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) =    329.10
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.28
   AVERAGE FLOW DEPTH(FEET) =  3.44   TRAVEL TIME(MIN.) =  1.77
   Tc(MIN.) =  22.29
   SUBAREA AREA(ACRES) =   100.09      SUBAREA RUNOFF(CFS) = 159.45
   EFFECTIVE AREA(ACRES) =    248.31     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     248.3       PEAK FLOW RATE(CFS) =    395.57

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.68   FLOW VELOCITY(FEET/SEC.) =  9.73
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31412.00 =   6383.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31412.00 TO NODE  31413.00 IS CODE = 51
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--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    468.00  DOWNSTREAM(FEET) =    428.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1135.00   CHANNEL SLOPE = 0.0352
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.979
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)   (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        56.18      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) =    438.02
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.26
   AVERAGE FLOW DEPTH(FEET) =  3.77   TRAVEL TIME(MIN.) =  1.84
   Tc(MIN.) =  24.13
   SUBAREA AREA(ACRES) =    56.18      SUBAREA RUNOFF(CFS) =  84.89
   EFFECTIVE AREA(ACRES) =    304.49     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     304.5       PEAK FLOW RATE(CFS) =    460.13

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.84   FLOW VELOCITY(FEET/SEC.) = 10.40
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31413.00 =   7518.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  31413.00 TO NODE  31414.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    428.00  DOWNSTREAM(FEET) =    394.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  888.00   CHANNEL SLOPE = 0.0383
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.919
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap       SCS
        LAND USE           GROUP    (ACRES)   (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -        35.49      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) =    485.98
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.89
   AVERAGE FLOW DEPTH(FEET) =  3.86   TRAVEL TIME(MIN.) =  1.36
   Tc(MIN.) =  25.49
   SUBAREA AREA(ACRES) =    35.49      SUBAREA RUNOFF(CFS) =  51.70
   EFFECTIVE AREA(ACRES) =    339.98     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     340.0       PEAK FLOW RATE(CFS) =    495.26

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.89   FLOW VELOCITY(FEET/SEC.) = 10.93
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31414.00 =   8406.00 FEET.
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****************************************************************************
   FLOW PROCESS FROM NODE   31414.00 TO NODE   31415.00 IS CODE =   51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    394.00  DOWNSTREAM(FEET) =     368.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1044.00   CHANNEL SLOPE = 0.0249
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.844
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp          Ap     SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -           26.50     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) =     513.67
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.39
   AVERAGE FLOW DEPTH(FEET) =  4.27   TRAVEL TIME(MIN.) =   1.85
   Tc(MIN.) =   27.35
   SUBAREA AREA(ACRES) =    26.50      SUBAREA RUNOFF(CFS) =   36.82
   EFFECTIVE AREA(ACRES) =    366.48      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       366.5          PEAK FLOW RATE(CFS) =     509.23

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  4.25   FLOW VELOCITY(FEET/SEC.) =   9.38
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31415.00 =    9450.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE   31415.00 TO NODE   31416.00 IS CODE =   51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    368.00  DOWNSTREAM(FEET) =     334.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1318.00   CHANNEL SLOPE = 0.0258
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.762
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp          Ap     SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -           52.53     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) =     543.80
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.64
   AVERAGE FLOW DEPTH(FEET) =  4.34   TRAVEL TIME(MIN.) =   2.28
   Tc(MIN.) =   29.62
   SUBAREA AREA(ACRES) =    52.53      SUBAREA RUNOFF(CFS) =   69.13
   EFFECTIVE AREA(ACRES) =    419.00      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       419.0          PEAK FLOW RATE(CFS) =     551.42

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  4.36   FLOW VELOCITY(FEET/SEC.) =   9.67
```

```
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31416.00 =   10768.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE   31416.00 TO NODE   31417.00 IS CODE =   51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    334.00  DOWNSTREAM(FEET) =     325.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1012.00   CHANNEL SLOPE = 0.0089
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.681
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp          Ap     SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -           16.45     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) =     561.64
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.52
   AVERAGE FLOW DEPTH(FEET) =  5.36   TRAVEL TIME(MIN.) =   2.59
   Tc(MIN.) =   32.21
   SUBAREA AREA(ACRES) =    16.45      SUBAREA RUNOFF(CFS) =   20.44
   EFFECTIVE AREA(ACRES) =    435.46      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       435.5          PEAK FLOW RATE(CFS) =     551.42
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  5.32   FLOW VELOCITY(FEET/SEC.) =   6.49
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31417.00 =   11780.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE   31417.00 TO NODE   31418.00 IS CODE =   51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    325.00  DOWNSTREAM(FEET) =     301.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1232.00   CHANNEL SLOPE = 0.0195
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.615
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp          Ap     SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED             -           13.50     0.30       0.694     -
   USER-DEFINED             -           32.00     0.30       1.000     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.909
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     578.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.81
   AVERAGE FLOW DEPTH(FEET) =  4.68   TRAVEL TIME(MIN.) =   2.33
   Tc(MIN.) =   34.54
   SUBAREA AREA(ACRES) =    45.50      SUBAREA RUNOFF(CFS) =   54.99
   EFFECTIVE AREA(ACRES) =    480.96      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.99
```

```
   TOTAL AREA(ACRES) =        481.0        PEAK FLOW RATE(CFS) =      570.57


   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 4.65   FLOW VELOCITY(FEET/SEC.) =   8.79
   LONGEST FLOWPATH FROM NODE  31400.00 TO NODE  31418.00 =   13012.00 FEET.
==============================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =        481.0  TC(MIN.) =      34.54
   EFFECTIVE AREA(ACRES) =      480.96  AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.991
   PEAK FLOW RATE(CFS)    =        570.57
==============================================================================
==============================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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   _____
   *********************************************************************
                RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
                (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
                (c) Copyright 1983-2013 Advanced Engineering Software (aes)
                   Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                          Analysis prepared by:

                        Michael Baker International
                       5 Hutton Centre Drive Suite 500
                            Santa Ana, CA 92707


   ************************** DESCRIPTION OF STUDY **************************
   * RMV PA-3 WATERSHED 15 EXISTING CONDITION                             *
   * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
   * 100-YR EV MARCH 2019 ROKAMOTO                                        *
    *********************************************************************

     FILE NAME: X31500EV.DAT
     TIME/DATE OF STUDY: 15:00 03/21/2019
   ========================================================================
     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   60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    2   50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    3   40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    4   30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
    5   20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

     GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
       1. Relative Flow-Depth =  0.00 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  31500.00 TO NODE  31501.00 IS CODE =  21
   ----------------------------------------------------------------------
     >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
     >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
   ======================================================================
```
Date: 04/20/2019   File name: X31500EV.RES   Page 1

```
     INITIAL SUBAREA FLOW-LENGTH(FEET) =   326.00
     ELEVATION DATA: UPSTREAM(FEET) =   416.00  DOWNSTREAM(FEET) =     379.00

     Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
     SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.043
     * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.080
     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
     "GRASS"                   -        0.66     0.30      1.000   98  11.04
     SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
     SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
     SUBAREA RUNOFF(CFS) =      1.65
     TOTAL AREA(ACRES) =      0.66   PEAK FLOW RATE(CFS) =       1.65

   **************************************************************************
     FLOW PROCESS FROM NODE  31501.00 TO NODE  31502.00 IS CODE =  51
   --------------------------------------------------------------------------
     >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
     >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ==========================================================================
     ELEVATION DATA: UPSTREAM(FEET) =   379.00  DOWNSTREAM(FEET) =    375.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =  179.00   CHANNEL SLOPE = 0.0223
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
     * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.900
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap    SCS
          LAND USE           GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
     USER-DEFINED              -        0.74     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) =     2.52
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.39
     AVERAGE FLOW DEPTH(FEET) =   0.59   TRAVEL TIME(MIN.) =   1.25
     Tc(MIN.) =   12.29
     SUBAREA AREA(ACRES) =     0.74      SUBAREA RUNOFF(CFS) =    1.74
     EFFECTIVE AREA(ACRES) =     1.40      AREA-AVERAGED Fm(INCH/HR) =   0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
     TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =      3.28

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) = 0.65   FLOW VELOCITY(FEET/SEC.) =  2.56
     LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31502.00 =    505.00 FEET.

   **************************************************************************
     FLOW PROCESS FROM NODE  31502.00 TO NODE  31503.00 IS CODE =  51
   --------------------------------------------------------------------------
     >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
     >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
   ==========================================================================
     ELEVATION DATA: UPSTREAM(FEET) =   375.00  DOWNSTREAM(FEET) =    374.00
     CHANNEL LENGTH THRU SUBAREA(FEET) =  151.00   CHANNEL SLOPE = 0.0066
     CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
     MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
     * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.724
     SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
      LAND USE          GROUP      (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -          1.23      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) =      4.62
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  1.76
 AVERAGE FLOW DEPTH(FEET) =  0.94   TRAVEL TIME(MIN.) =  1.43
 Tc(MIN.) =  13.72
 SUBAREA AREA(ACRES) =     1.23      SUBAREA RUNOFF(CFS) =    2.67
 EFFECTIVE AREA(ACRES) =      2.63     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) =      5.73

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.01   FLOW VELOCITY(FEET/SEC.) =  1.87
 LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31503.00 =    656.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31503.00 TO NODE  31504.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    374.00  DOWNSTREAM(FEET) =    372.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   184.00   CHANNEL SLOPE = 0.0109
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.591
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
      LAND USE          GROUP      (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -          2.17      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) =      7.97
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  2.42
 AVERAGE FLOW DEPTH(FEET) =  1.05   TRAVEL TIME(MIN.) =  1.27
 Tc(MIN.) =  14.99
 SUBAREA AREA(ACRES) =     2.17      SUBAREA RUNOFF(CFS) =    4.47
 EFFECTIVE AREA(ACRES) =      4.80     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      9.89

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.13   FLOW VELOCITY(FEET/SEC.) =  2.56
 LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31504.00 =    840.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31504.00 TO NODE  31505.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    372.00  DOWNSTREAM(FEET) =    360.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   268.00   CHANNEL SLOPE = 0.0448
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.502
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
      LAND USE          GROUP      (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -          2.94      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) =     12.81
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.65
 AVERAGE FLOW DEPTH(FEET) =  0.96   TRAVEL TIME(MIN.) =  0.96
 Tc(MIN.) =  15.95
 SUBAREA AREA(ACRES) =     2.94      SUBAREA RUNOFF(CFS) =    5.83
 EFFECTIVE AREA(ACRES) =      7.74     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        7.7       PEAK FLOW RATE(CFS) =     15.33

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.03   FLOW VELOCITY(FEET/SEC.) =  4.86
 LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31505.00 =   1108.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31505.00 TO NODE  31506.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    360.00  DOWNSTREAM(FEET) =    320.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   622.00   CHANNEL SLOPE = 0.0643
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.360
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
      LAND USE          GROUP      (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED             -          6.03      0.30      0.984     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.984
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     20.94
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.00
 AVERAGE FLOW DEPTH(FEET) =  1.08   TRAVEL TIME(MIN.) =  1.73
 Tc(MIN.) =  17.68
 SUBAREA AREA(ACRES) =     6.03      SUBAREA RUNOFF(CFS) =   11.20
 EFFECTIVE AREA(ACRES) =     13.77     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   0.99
 TOTAL AREA(ACRES) =       13.8       PEAK FLOW RATE(CFS) =     25.55

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.16   FLOW VELOCITY(FEET/SEC.) =  6.30
 LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31506.00 =   1730.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  31506.00 TO NODE  31507.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    320.00  DOWNSTREAM(FEET) =    315.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   391.00   CHANNEL SLOPE = 0.0128
```

```
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.255
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL     AREA       Fp        Ap       SCS
        LAND USE             GROUP      (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED                -         2.67       0.30       0.611     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.611
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     28.04
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.38
   AVERAGE FLOW DEPTH(FEET) = 1.46    TRAVEL TIME(MIN.) =  1.49
   Tc(MIN.) =   19.16
   SUBAREA AREA(ACRES) =     2.67       SUBAREA RUNOFF(CFS) =    4.97
   EFFECTIVE AREA(ACRES) =     16.43      AREA-AVERAGED Fm(INCH/HR) =   0.28
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.93
   TOTAL AREA(ACRES) =        16.4          PEAK FLOW RATE(CFS) =      29.22

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.48   FLOW VELOCITY(FEET/SEC.) =   4.43
   LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31507.00 =   2121.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  31507.00 TO NODE  31508.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    315.00  DOWNSTREAM(FEET) =    313.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  427.00   CHANNEL SLOPE = 0.0047
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.121
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL     AREA       Fp        Ap       SCS
        LAND USE             GROUP      (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED                -        10.20       0.30       0.527     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.527
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     38.22
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.25
   AVERAGE FLOW DEPTH(FEET) = 1.98    TRAVEL TIME(MIN.) =  2.19
   Tc(MIN.) =   21.35
   SUBAREA AREA(ACRES) =    10.20       SUBAREA RUNOFF(CFS) =   18.01
   EFFECTIVE AREA(ACRES) =     26.63      AREA-AVERAGED Fm(INCH/HR) =   0.23
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.78
   TOTAL AREA(ACRES) =        26.6          PEAK FLOW RATE(CFS) =      45.25

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.11   FLOW VELOCITY(FEET/SEC.) =   3.39
   LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31508.00 =   2548.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  31508.00 TO NODE  31509.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    313.00  DOWNSTREAM(FEET) =    296.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  495.00   CHANNEL SLOPE = 0.0343
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.063
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL     AREA       Fp        Ap       SCS
        LAND USE             GROUP      (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED                -         8.30       0.30       1.000     -
   USER-DEFINED                -        10.50       0.30       0.500     -
   USER-DEFINED                -         1.60       0.30       0.850     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.731
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     62.18
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.75
   AVERAGE FLOW DEPTH(FEET) = 1.64    TRAVEL TIME(MIN.) =  1.06
   Tc(MIN.) =   22.42
   SUBAREA AREA(ACRES) =    20.40       SUBAREA RUNOFF(CFS) =   33.86
   EFFECTIVE AREA(ACRES) =     47.03      AREA-AVERAGED Fm(INCH/HR) =   0.23
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   0.76
   TOTAL AREA(ACRES) =        47.0          PEAK FLOW RATE(CFS) =      77.73

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.78   FLOW VELOCITY(FEET/SEC.) =   8.17
   LONGEST FLOWPATH FROM NODE  31500.00 TO NODE  31509.00 =   3043.00 FEET.
===========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =        47.0  TC(MIN.) =     22.42
   EFFECTIVE AREA(ACRES) =       47.03  AREA-AVERAGED Fm(INCH/HR)= 0.23
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.757
   PEAK FLOW RATE(CFS)   =       77.73
===========================================================================

===========================================================================
   END OF RATIONAL METHOD ANALYSIS
```

```
 _____
 *****************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
            (c) Copyright 1983-2013 Advanced Engineering Software (aes)
             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                     Michael Baker International
                   5 Hutton Centre Drive Suite 500
                       Santa Ana, CA 92707


 ************************* DESCRIPTION OF STUDY *************************
 * RMV PA-3 WATERSHED 16 EXISTING CONDITION                           *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
 * 100-YR EV  MARCH 2019 ROKAMOTO                                     *
 *********************************************************************

   FILE NAME: X31600EV.DAT
   TIME/DATE OF STUDY: 15:06 03/21/2019
 ===============================================================================
   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  60.0    30.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0     0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31600.00 TO NODE  31601.00 IS CODE =  21
 ---------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ===============================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
   ELEVATION DATA: UPSTREAM(FEET) =   672.00  DOWNSTREAM(FEET) =    582.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.296
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.396
   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
   "GRASS"                   -         0.52      0.30     1.000   98   9.30
   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) =       0.52   PEAK FLOW RATE(CFS) =      1.46

 *******************************************************************************
   FLOW PROCESS FROM NODE  31601.00 TO NODE  31602.00 IS CODE =  51
 ---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   582.00  DOWNSTREAM(FEET) =    554.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  229.00   CHANNEL SLOPE = 0.1223
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.240
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp       Ap    SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL) CN
   USER-DEFINED              -        1.33      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) =      3.22
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.74
   AVERAGE FLOW DEPTH(FEET) =   0.48   TRAVEL TIME(MIN.) =   0.80
   Tc(MIN.) =   10.10
   SUBAREA AREA(ACRES) =      1.33        SUBAREA RUNOFF(CFS) =      3.52
   EFFECTIVE AREA(ACRES) =      1.86      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        1.9        PEAK FLOW RATE(CFS) =       4.91

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.55   FLOW VELOCITY(FEET/SEC.) =   5.33
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31602.00 =     558.00 FEET.

 *******************************************************************************
   FLOW PROCESS FROM NODE  31602.00 TO NODE  31603.00 IS CODE =  51
 ---------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   554.00  DOWNSTREAM(FEET) =    545.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  149.00   CHANNEL SLOPE = 0.0604
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 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
 USER-DEFINED            -        2.68     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) =      8.35
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.65
 AVERAGE FLOW DEPTH(FEET) =   0.77   TRAVEL TIME(MIN.) =   0.53
 Tc(MIN.) =   10.63
 SUBAREA AREA(ACRES) =     2.68      SUBAREA RUNOFF(CFS) =    6.88
 EFFECTIVE AREA(ACRES) =      4.54    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        4.5       PEAK FLOW RATE(CFS) =     11.63

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.87   FLOW VELOCITY(FEET/SEC.) =  5.07
 LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31603.00 =    707.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31603.00 TO NODE  31604.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   545.00  DOWNSTREAM(FEET) =    525.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   184.00   CHANNEL SLOPE = 0.1087
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 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            -        3.07     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) =      15.47
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.77
 AVERAGE FLOW DEPTH(FEET) =   0.87   TRAVEL TIME(MIN.) =   0.45
 Tc(MIN.) =   11.09
 SUBAREA AREA(ACRES) =     3.07      SUBAREA RUNOFF(CFS) =    7.67
 EFFECTIVE AREA(ACRES) =      7.61    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        7.6       PEAK FLOW RATE(CFS) =     19.00

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.94   FLOW VELOCITY(FEET/SEC.) =  7.15
 LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31604.00 =    891.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31604.00 TO NODE  31605.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   525.00  DOWNSTREAM(FEET) =    495.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   266.00   CHANNEL SLOPE = 0.1128
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.987
  SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap      SCS
     LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
 USER-DEFINED            -        4.69     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) =      24.67
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.71
 AVERAGE FLOW DEPTH(FEET) =   1.03   TRAVEL TIME(MIN.) =   0.58
 Tc(MIN.) =   11.66
 SUBAREA AREA(ACRES) =     4.69      SUBAREA RUNOFF(CFS) =   11.34
 EFFECTIVE AREA(ACRES) =     12.30    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       12.3       PEAK FLOW RATE(CFS) =     29.75

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.10   FLOW VELOCITY(FEET/SEC.) =  8.14
 LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31605.00 =   1157.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31605.00 TO NODE  31606.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   495.00  DOWNSTREAM(FEET) =    470.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   444.00   CHANNEL SLOPE = 0.0563
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.838
  SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap      SCS
     LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
 USER-DEFINED            -        8.98     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) =      40.01
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.74
 AVERAGE FLOW DEPTH(FEET) =   1.41   TRAVEL TIME(MIN.) =   1.10
 Tc(MIN.) =   12.76
 SUBAREA AREA(ACRES) =     8.98      SUBAREA RUNOFF(CFS) =   20.51
 EFFECTIVE AREA(ACRES) =     21.28    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       21.3       PEAK FLOW RATE(CFS) =     48.62

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.51   FLOW VELOCITY(FEET/SEC.) =  7.07
 LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31606.00 =   1601.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  31606.00 TO NODE  31607.00 IS CODE =  51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   470.00  DOWNSTREAM(FEET) =    439.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   763.00   CHANNEL SLOPE = 0.0406
```

```
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.629
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED                -       20.37      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) =      69.97
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.86
   AVERAGE FLOW DEPTH(FEET) = 1.84    TRAVEL TIME(MIN.) =  1.85
   Tc(MIN.) =  14.61
   SUBAREA AREA(ACRES) =   20.37      SUBAREA RUNOFF(CFS) =   42.69
   EFFECTIVE AREA(ACRES) =     41.65     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     41.6          PEAK FLOW RATE(CFS) =      87.29

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.00   FLOW VELOCITY(FEET/SEC.) =  7.25
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31607.00 =   2364.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  31607.00 TO NODE  31608.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    439.00  DOWNSTREAM(FEET) =    380.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1396.00   CHANNEL SLOPE = 0.0423
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.366
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED                -       25.28      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) =     110.81
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.79
   AVERAGE FLOW DEPTH(FEET) = 2.18    TRAVEL TIME(MIN.) =  2.99
   Tc(MIN.) =  17.60
   SUBAREA AREA(ACRES) =   25.28      SUBAREA RUNOFF(CFS) =   47.02
   EFFECTIVE AREA(ACRES) =     66.93     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     66.9          PEAK FLOW RATE(CFS) =     124.46

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.27   FLOW VELOCITY(FEET/SEC.) =  8.05
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31608.00 =   3760.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  31608.00 TO NODE  31609.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    380.00  DOWNSTREAM(FEET) =    350.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  715.00   CHANNEL SLOPE = 0.0420
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.263
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED                -       19.63      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) =     141.81
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.27
   AVERAGE FLOW DEPTH(FEET) = 2.39    TRAVEL TIME(MIN.) =  1.44
   Tc(MIN.) =  19.04
   SUBAREA AREA(ACRES) =   19.63      SUBAREA RUNOFF(CFS) =   34.69
   EFFECTIVE AREA(ACRES) =     86.56     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     86.6          PEAK FLOW RATE(CFS) =     152.94

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.46   FLOW VELOCITY(FEET/SEC.) =  8.43
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31609.00 =   4475.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  31609.00 TO NODE  31610.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    325.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  948.00   CHANNEL SLOPE = 0.0264
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.128
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED                -       17.36      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) =     167.23
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.24
   AVERAGE FLOW DEPTH(FEET) = 2.77    TRAVEL TIME(MIN.) =  2.18
   Tc(MIN.) =  21.22
   SUBAREA AREA(ACRES) =   17.36      SUBAREA RUNOFF(CFS) =   28.57
   EFFECTIVE AREA(ACRES) =    103.92     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =    103.9          PEAK FLOW RATE(CFS) =     171.02

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.80   FLOW VELOCITY(FEET/SEC.) =  7.29
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31610.00 =   5423.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  31610.00 TO NODE  31611.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     325.00  DOWNSTREAM(FEET) =     310.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1182.00   CHANNEL SLOPE = 0.0127
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   20.00
   *  25 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              -        69.76      0.30      0.990     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.990
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     224.18
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.36
   AVERAGE FLOW DEPTH(FEET) =  3.19   TRAVEL TIME(MIN.) =   2.68
   Tc(MIN.) =  23.90
   SUBAREA AREA(ACRES) =    69.76       SUBAREA RUNOFF(CFS) = 106.30
   EFFECTIVE AREA(ACRES) =    173.68      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       173.7         PEAK FLOW RATE(CFS) =     264.37

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.39   FLOW VELOCITY(FEET/SEC.) =  7.66
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31611.00 =   6605.00 FEET.

******************************************************************************
   FLOW PROCESS FROM NODE  31611.00 TO NODE  31612.00 IS CODE = 51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     310.00  DOWNSTREAM(FEET) =     308.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  164.00   CHANNEL SLOPE = 0.0122
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =    3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.973
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        17.90      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) =     277.85
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.64
   AVERAGE FLOW DEPTH(FEET) =  3.48   TRAVEL TIME(MIN.) =   0.36
   Tc(MIN.) =  24.26
   SUBAREA AREA(ACRES) =    17.90       SUBAREA RUNOFF(CFS) =  26.96
   EFFECTIVE AREA(ACRES) =    191.58      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       191.6         PEAK FLOW RATE(CFS) =     288.72

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 3.53   FLOW VELOCITY(FEET/SEC.) =  7.73
   LONGEST FLOWPATH FROM NODE  31600.00 TO NODE  31612.00 =   6769.00 FEET.
==============================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =      191.6  TC(MIN.) =     24.26
```

```
   EFFECTIVE AREA(ACRES) =    191.58  AREA-AVERAGED Fm(INCH/HR)= 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.996
   PEAK FLOW RATE(CFS)   =      288.72
==============================================================================
==============================================================================
   END OF RATIONAL METHOD ANALYSIS
```

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

                        Michael Baker International
                      5 Hutton Centre Drive Suite 500
                           Santa Ana, CA 92707


  *************************** DESCRIPTION OF STUDY **************************
 * RMV PA-3 WATERSHED 17A EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 100-YR EV  MARCH 2019 ROKAMOTO                                         *
  *************************************************************************

  FILE NAME: X17A00EV.DAT
  TIME/DATE OF STUDY: 15:11 03/21/2019
 =========================================================================
  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  60.0    30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31700.00 TO NODE  31701.00 IS CODE =  21
 -------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 =========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   321.00
  ELEVATION DATA: UPSTREAM(FEET) =   545.00  DOWNSTREAM(FEET) =    515.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.410
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.024
  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
  "GRASS"                    -       0.43     0.30     1.000   98  11.41
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.04
  TOTAL AREA(ACRES) =       0.43   PEAK FLOW RATE(CFS) =       1.04

 *************************************************************************
  FLOW PROCESS FROM NODE  31701.00 TO NODE  31702.00 IS CODE =  51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   515.00  DOWNSTREAM(FEET) =    490.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.1147
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.917
  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
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    1.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.84
  AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   0.75
  Tc(MIN.) =   12.16
  SUBAREA AREA(ACRES) =     0.40      SUBAREA RUNOFF(CFS) =    0.94
  EFFECTIVE AREA(ACRES) =       0.83      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =          0.8        PEAK FLOW RATE(CFS) =       1.95

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   FLOW VELOCITY(FEET/SEC.) =   5.13
  LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31702.00 =     539.00 FEET.

 *************************************************************************
  FLOW PROCESS FROM NODE  31702.00 TO NODE  31703.00 IS CODE =  51
 -------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 =========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   490.00  DOWNSTREAM(FEET) =    465.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  300.00   CHANNEL SLOPE = 0.0833
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.768
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
       DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap     SCS
          LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
       USER-DEFINED             -        1.55    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) =      3.67
       TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.25
       AVERAGE FLOW DEPTH(FEET) =  0.54   TRAVEL TIME(MIN.) =   1.18
       Tc(MIN.) =   13.34
       SUBAREA AREA(ACRES) =     1.55      SUBAREA RUNOFF(CFS) =    3.45
       EFFECTIVE AREA(ACRES) =      2.38    AREA-AVERAGED Fm(INCH/HR) =  0.30
       AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
       TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =      5.29

       END OF SUBAREA CHANNEL FLOW HYDRAULICS:
       DEPTH(FEET) = 0.61   FLOW VELOCITY(FEET/SEC.) =   4.69
       LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31703.00 =    839.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31703.00 TO NODE  31704.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    465.00  DOWNSTREAM(FEET) =    462.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    83.00   CHANNEL SLOPE = 0.0361
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 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             -        2.59    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) =      8.12
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  3.81
   AVERAGE FLOW DEPTH(FEET) =  0.84   TRAVEL TIME(MIN.) =   0.36
   Tc(MIN.) =   13.70
   SUBAREA AREA(ACRES) =     2.59      SUBAREA RUNOFF(CFS) =    5.66
   EFFECTIVE AREA(ACRES) =      4.97    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        5.0        PEAK FLOW RATE(CFS) =     10.85

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.94   FLOW VELOCITY(FEET/SEC.) =   4.13
   LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31704.00 =    922.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31704.00 TO NODE  31705.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    462.00  DOWNSTREAM(FEET) =    460.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    60.00   CHANNEL SLOPE = 0.0333
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.702
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap     SCS
          LAND USE         GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        5.22    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) =     16.50
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.45
   AVERAGE FLOW DEPTH(FEET) =  1.11   TRAVEL TIME(MIN.) =   0.22
   Tc(MIN.) =   13.93
   SUBAREA AREA(ACRES) =     5.22      SUBAREA RUNOFF(CFS) =   11.28
   EFFECTIVE AREA(ACRES) =     10.19    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       10.2        PEAK FLOW RATE(CFS) =     22.03

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.24   FLOW VELOCITY(FEET/SEC.) =   4.77
   LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31705.00 =    982.00 FEET.

*****************************************************************************
   FLOW PROCESS FROM NODE  31705.00 TO NODE  31706.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    460.00  DOWNSTREAM(FEET) =    375.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   604.00    CHANNEL SLOPE = 0.1407
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.584
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap     SCS
          LAND USE         GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -        8.10    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) =     30.36
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.82
   AVERAGE FLOW DEPTH(FEET) =  1.07   TRAVEL TIME(MIN.) =   1.14
   Tc(MIN.) =   15.07
   SUBAREA AREA(ACRES) =     8.10      SUBAREA RUNOFF(CFS) =   16.65
   EFFECTIVE AREA(ACRES) =     18.29    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       18.3        PEAK FLOW RATE(CFS) =     37.60

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.16   FLOW VELOCITY(FEET/SEC.) =   9.36
   LONGEST FLOWPATH FROM NODE  31700.00 TO NODE  31706.00 =   1586.00 FEET.
===========================================================================
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)      =       18.3  TC(MIN.) =     15.07
   EFFECTIVE AREA(ACRES) =      18.29 AREA-AVERAGED Fm(INCH/HR)=  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
   PEAK FLOW RATE(CFS)    =      37.60
===========================================================================
===========================================================================
   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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                 Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                     Michael Baker International
                   5 Hutton Centre Drive Suite 500
                        Santa Ana, CA 92707


  ************************* DESCRIPTION OF STUDY *************************
  * RMV PA-3 WATERSHED 17B EXISTING CONDITION                          *
  * RATIONAL METHOD HYDROLOGY MODEL LOCAL                              *
  * 100-YR EV  MARCH 2019 ROKAMOTO                                     *
  **********************************************************************

   FILE NAME: X17B00EV.DAT
   TIME/DATE OF STUDY: 15:32 03/21/2019
  =====================================================================
   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  60.0    30.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   2  50.0    25.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   3  40.0    20.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   4  30.0    15.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150
   5  20.0    10.0     0.020/0.020/0.020   0.67   2.00 0.0313 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  31710.00 TO NODE  31711.00 IS CODE = 21
  ---------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
  =====================================================================
```
Date: 04/20/2019   File name: X17B00EV.RES   Page 1

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
   ELEVATION DATA: UPSTREAM(FEET) =    631.00  DOWNSTREAM(FEET) =   605.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.719
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.979
   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
   "CHAPARRAL,BROADLEAF"       -       0.32      0.30    1.000   98  11.72
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
   SUBAREA RUNOFF(CFS) =       0.78
   TOTAL AREA(ACRES) =        0.32    PEAK FLOW RATE(CFS) =       0.78

  *********************************************************************************
   FLOW PROCESS FROM NODE  31711.00 TO NODE  31712.00 IS CODE = 51
  -----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  =============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    588.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    71.00   CHANNEL SLOPE = 0.2394
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.945
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/        SCS SOIL   AREA      Fp       Ap    SCS
        LAND USE             GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
   USER-DEFINED               -        0.56      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) =    1.44
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.07
   AVERAGE FLOW DEPTH(FEET) =   0.31    TRAVEL TIME(MIN.) =   0.23
   Tc(MIN.) =   11.95
   SUBAREA AREA(ACRES) =     0.56       SUBAREA RUNOFF(CFS) =    1.33
   EFFECTIVE AREA(ACRES) =      0.88      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) =      2.10

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.36   FLOW VELOCITY(FEET/SEC.) =   5.53
   LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31712.00 =     391.00 FEET.

  *********************************************************************************
   FLOW PROCESS FROM NODE  31712.00 TO NODE  31713.00 IS CODE = 51
  -----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
  =============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    588.00  DOWNSTREAM(FEET) =    565.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   181.00   CHANNEL SLOPE = 0.1271
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.857
   SUBAREA LOSS RATE DATA(AMC  II):
```
Date: 04/20/2019   File name: X17B00EV.RES   Page 2

```
 DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED              -        0.31      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) =       2.46
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.56
 AVERAGE FLOW DEPTH(FEET) =  0.42   TRAVEL TIME(MIN.) =  0.66
 Tc(MIN.) =   12.61
 SUBAREA AREA(ACRES) =     0.31      SUBAREA RUNOFF(CFS) =    0.72
 EFFECTIVE AREA(ACRES) =     1.20     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        1.2       PEAK FLOW RATE(CFS) =      2.75

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   FLOW VELOCITY(FEET/SEC.) =  4.63
 LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31713.00 =    572.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31713.00 TO NODE  31714.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =    545.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  185.00   CHANNEL SLOPE = 0.1081
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.779
  SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED              -        1.36      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) =       4.27
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.90
 AVERAGE FLOW DEPTH(FEET) =  0.54   TRAVEL TIME(MIN.) =  0.63
 Tc(MIN.) =   13.24
 SUBAREA AREA(ACRES) =     1.36      SUBAREA RUNOFF(CFS) =    3.03
 EFFECTIVE AREA(ACRES) =     2.56     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) =      5.70

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.60   FLOW VELOCITY(FEET/SEC.) =  5.28
 LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31714.00 =    757.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  31714.00 TO NODE  31715.00 IS CODE =  51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    531.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  128.00   CHANNEL SLOPE = 0.1094
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.737
  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
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.77
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 5.89
 AVERAGE FLOW DEPTH(FEET) =  0.70   TRAVEL TIME(MIN.) =  0.36
 Tc(MIN.) =   13.61
 SUBAREA AREA(ACRES) =     2.80      SUBAREA RUNOFF(CFS) =    6.14
 EFFECTIVE AREA(ACRES) =     5.35     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =     11.74

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.78   FLOW VELOCITY(FEET/SEC.) =  6.38
 LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31715.00 =    885.00 FEET.

***********************************************************************************
  FLOW PROCESS FROM NODE  31715.00 TO NODE  31716.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    531.00  DOWNSTREAM(FEET) =    507.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  270.00   CHANNEL SLOPE = 0.0889
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.662
  SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)   CN
 USER-DEFINED              -        5.95      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) =      18.06
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 6.55
 AVERAGE FLOW DEPTH(FEET) =  0.96   TRAVEL TIME(MIN.) =  0.69
 Tc(MIN.) =   14.29
 SUBAREA AREA(ACRES) =     5.95      SUBAREA RUNOFF(CFS) =   12.64
 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) =     24.02

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.07   FLOW VELOCITY(FEET/SEC.) =  7.06
 LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31716.00 =   1155.00 FEET.

***********************************************************************************
  FLOW PROCESS FROM NODE  31716.00 TO NODE  31717.00 IS CODE =  51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    507.00  DOWNSTREAM(FEET) =    400.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 1020.00   CHANNEL SLOPE = 0.1049
```

```
CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
*  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.469
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap    SCS
    LAND USE             GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
USER-DEFINED               -       13.90      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) =      37.59
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.37
AVERAGE FLOW DEPTH(FEET) =   1.22   TRAVEL TIME(MIN.) =   2.03
Tc(MIN.) =   16.32
SUBAREA AREA(ACRES) =    13.90       SUBAREA RUNOFF(CFS) =   27.14
EFFECTIVE AREA(ACRES) =     25.20     AREA-AVERAGED Fm(INCH/HR) =   0.30
AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =        25.2        PEAK FLOW RATE(CFS) =      49.19

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.35   FLOW VELOCITY(FEET/SEC.) =   8.95
LONGEST FLOWPATH FROM NODE  31710.00 TO NODE  31717.00 =    2175.00 FEET.
==============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =        25.2  TC(MIN.) =      16.32
EFFECTIVE AREA(ACRES) =      25.20  AREA-AVERAGED Fm(INCH/HR)=  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)   =        49.19
==============================================================================
==============================================================================
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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                          Analysis prepared by:

                        Michael Baker International
                     5 Hutton Centre Drive, Suite 500
                           Santa Ana, CA 92707


 *************************** DESCRIPTION OF STUDY ***************************
 * RUNOFF MANAGEMENT PLAN - RANCHO MISSION VIEJO                          *
 * EXISTING CONDITION - PLANNING AREA 3 - WATERSHED 18                    *
 * 100-YR EV MARCH 2019 FKAZI                                             *
 *************************************************************************

   FILE NAME: X31800EV.DAT
   TIME/DATE OF STUDY: 13:46 03/28/2019
========================================================================
   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  60.0     30.0    0.020/0.020/0.020    0.67   2.00 0.0312 0.167 0.0150
  2  50.0     25.0    0.020/0.020/0.020    0.67   2.00 0.0312 0.167 0.0150
  3  40.0     20.0    0.020/0.020/0.020    0.67   2.00 0.0312 0.167 0.0150
  4  30.0     15.0    0.020/0.020/0.020    0.67   2.00 0.0312 0.167 0.0150
  5  20.0     10.0    0.020/0.020/0.020    0.67   2.00 0.0312 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  31800.00 TO NODE  31801.00 IS CODE =  21
------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =    329.00
   ELEVATION DATA: UPSTREAM(FEET) =     729.00  DOWNSTREAM(FEET) =      630.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.120
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.433
   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
   "CHAPARRAL,BROADLEAF"      -        0.10     0.30      1.000      0   9.12
   NATURAL FAIR COVER
   "CHAPARRAL,NARROWLEAF"     -        0.10     0.30      1.000      0   9.12
   NATURAL FAIR COVER
   "OPEN BRUSH"              -        1.30     0.30      1.000      0   9.12
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =       4.23
   TOTAL AREA(ACRES) =       1.50   PEAK FLOW RATE(CFS) =       4.23


*************************************************************************
   FLOW PROCESS FROM NODE  31801.00 TO NODE  31802.00 IS CODE =  51
------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =     597.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   196.00   CHANNEL SLOPE = 0.1684
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       4.23
   FLOW VELOCITY(FEET/SEC.) =   5.80   FLOW DEPTH(FEET) =   0.49
   TRAVEL TIME(MIN.) =   0.56   Tc(MIN.) =    9.68
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31802.00 =     525.00 FEET.

*************************************************************************
   FLOW PROCESS FROM NODE  31802.00 TO NODE  31802.00 IS CODE =  81
------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   MAINLINE Tc(MIN.) =   9.68
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.318
   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              -        1.80     0.30      1.000      -
   USER-DEFINED              -        0.10     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) =     2.00       SUBAREA RUNOFF(CFS) =     5.43
   EFFECTIVE AREA(ACRES) =      3.50   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =      3.5       PEAK FLOW RATE(CFS) =      9.51

*************************************************************************
   FLOW PROCESS FROM NODE  31802.00 TO NODE  31803.00 IS CODE =  51
------------------------------------------------------------------------
```

```
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    597.00  DOWNSTREAM(FEET) =     565.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   225.00   CHANNEL SLOPE = 0.1422
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       9.51
   FLOW VELOCITY(FEET/SEC.) =   6.67   FLOW DEPTH(FEET) =   0.69
   TRAVEL TIME(MIN.) =   0.56   Tc(MIN.) =   10.25
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31803.00 =     750.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31803.00 TO NODE  31803.00 IS CODE = 81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   MAINLINE Tc(MIN.) =   10.25
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.214
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -       2.10     0.30      1.000     -
   USER-DEFINED               -       0.20     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) =    2.30      SUBAREA RUNOFF(CFS) =    6.03
   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) =       15.21

***************************************************************************
   FLOW PROCESS FROM NODE  31803.00 TO NODE  31804.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    565.00  DOWNSTREAM(FEET) =     530.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   228.00   CHANNEL SLOPE = 0.1535
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       15.21
   FLOW VELOCITY(FEET/SEC.) =   7.70   FLOW DEPTH(FEET) =   0.81
   TRAVEL TIME(MIN.) =   0.49   Tc(MIN.) =   10.74
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31804.00 =     978.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31804.00 TO NODE  31804.00 IS CODE = 81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   MAINLINE Tc(MIN.) =   10.74
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.129
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
        LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED               -       4.10     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) =    4.70      SUBAREA RUNOFF(CFS) =   11.97
   EFFECTIVE AREA(ACRES) =      10.50   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =         10.5       PEAK FLOW RATE(CFS) =       26.74

***************************************************************************
   FLOW PROCESS FROM NODE  31804.00 TO NODE  31805.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    530.00  DOWNSTREAM(FEET) =     498.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   414.00   CHANNEL SLOPE = 0.0773
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       26.74
   FLOW VELOCITY(FEET/SEC.) =   6.86   FLOW DEPTH(FEET) =   1.14
   TRAVEL TIME(MIN.) =   1.01   Tc(MIN.) =   11.74
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31805.00 =    1392.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  31805.00 TO NODE  31805.00 IS CODE = 81
---------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
   MAINLINE Tc(MIN.) =   11.74
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.975
   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               -       5.70     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) =    6.70      SUBAREA RUNOFF(CFS) =   16.13
   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) =       41.41

***************************************************************************
   FLOW PROCESS FROM NODE  31805.00 TO NODE  31806.00 IS CODE = 51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    498.00  DOWNSTREAM(FEET) =     454.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE = 0.0649
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       41.41
   FLOW VELOCITY(FEET/SEC.) =   7.19   FLOW DEPTH(FEET) =   1.39
   TRAVEL TIME(MIN.) =   1.57   Tc(MIN.) =   13.32
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31806.00 =    2070.00 FEET.

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

```
   FLOW PROCESS FROM NODE  31806.00 TO NODE  31806.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   13.32
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.771
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN
   USER-DEFINED            -        2.10      0.30      1.000      -
   USER-DEFINED            -        0.40      0.30      1.000      -
   USER-DEFINED            -        7.90      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) =   10.40     SUBAREA RUNOFF(CFS) =   23.13
   EFFECTIVE AREA(ACRES) =     27.60   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       27.6     PEAK FLOW RATE(CFS) =        61.37

********************************************************************************
   FLOW PROCESS FROM NODE  31806.00 TO NODE  31819.00 IS CODE =  51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    454.00  DOWNSTREAM(FEET) =    410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  737.00   CHANNEL SLOPE = 0.0597
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      61.37
   FLOW VELOCITY(FEET/SEC.) =  7.65   FLOW DEPTH(FEET) =  1.64
   TRAVEL TIME(MIN.) =   1.61   Tc(MIN.) =   14.92
   LONGEST FLOWPATH FROM NODE  31800.00 TO NODE  31819.00 =   2807.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 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
   USER-DEFINED            -        0.70      0.30      1.000      -
   USER-DEFINED            -        0.30      0.30      1.000      -
   USER-DEFINED            -        5.60      0.30      1.000      -
   USER-DEFINED            -        0.50      0.30      1.000      -
   USER-DEFINED            -        0.30      0.30      1.000      -
   USER-DEFINED            -        6.30      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) =   13.70     SUBAREA RUNOFF(CFS) =   28.33
   EFFECTIVE AREA(ACRES) =     41.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       41.3     PEAK FLOW RATE(CFS) =        85.41

********************************************************************************
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```
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 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
   USER-DEFINED            -        0.20      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) =   0.20     SUBAREA RUNOFF(CFS) =    0.41
   EFFECTIVE AREA(ACRES) =     41.50   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       41.5     PEAK FLOW RATE(CFS) =        85.82

********************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 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) =   2.60
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =      41.50
   TOTAL STREAM AREA(ACRES) =      41.50
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      85.82

********************************************************************************
   FLOW PROCESS FROM NODE  31810.00 TO NODE  31811.00 IS CODE =  21
--------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   395.00
   ELEVATION DATA: UPSTREAM(FEET) =    697.00  DOWNSTREAM(FEET) =    645.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.576
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.999
   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   11.58
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =     0.97
   TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =       0.97

********************************************************************************
   FLOW PROCESS FROM NODE  31811.00 TO NODE  31812.00 IS CODE =  51
--------------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    610.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   148.00   CHANNEL SLOPE = 0.2365
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =        0.97
  FLOW VELOCITY(FEET/SEC.) =   4.64    FLOW DEPTH(FEET) =   0.26
  TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =    12.11
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31812.00 =     543.00 FEET.
*********************************************************************************
  FLOW PROCESS FROM NODE  31812.00 TO NODE  31812.00 IS CODE = 81
---------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=================================================================================
  MAINLINE Tc(MIN.) =   12.11
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.924
  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     0.30      1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    0.71
  EFFECTIVE AREA(ACRES) =     0.70    AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.000
  TOTAL AREA(ACRES) =          0.7       PEAK FLOW RATE(CFS) =       1.65
*********************************************************************************
  FLOW PROCESS FROM NODE  31812.00 TO NODE  31813.00 IS CODE = 51
---------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =    591.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   176.00   CHANNEL SLOPE = 0.1080
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =        1.65
  FLOW VELOCITY(FEET/SEC.) =   3.88    FLOW DEPTH(FEET) =   0.38
  TRAVEL TIME(MIN.) =   0.76   Tc(MIN.) =    12.86
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31813.00 =     719.00 FEET.
*********************************************************************************
  FLOW PROCESS FROM NODE  31813.00 TO NODE  31813.00 IS CODE = 81
---------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=================================================================================
  MAINLINE Tc(MIN.) =   12.86
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.826
  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      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
```

```
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    2.50
  EFFECTIVE AREA(ACRES) =     1.80    AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.000
  TOTAL AREA(ACRES) =          1.8       PEAK FLOW RATE(CFS) =       4.09
*********************************************************************************
  FLOW PROCESS FROM NODE  31813.00 TO NODE  31814.00 IS CODE = 51
---------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    591.00  DOWNSTREAM(FEET) =    576.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   184.00   CHANNEL SLOPE = 0.0815
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =        4.09
  FLOW VELOCITY(FEET/SEC.) =   4.35    FLOW DEPTH(FEET) =   0.56
  TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =    13.57
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31814.00 =     903.00 FEET.
*********************************************************************************
  FLOW PROCESS FROM NODE  31814.00 TO NODE  31814.00 IS CODE = 81
---------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=================================================================================
  MAINLINE Tc(MIN.) =   13.57
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.742
  SUBAREA LOSS RATE DATA(AMC II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap       SCS
       LAND USE           GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        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) =    3.50      SUBAREA RUNOFF(CFS) =    7.69
  EFFECTIVE AREA(ACRES) =     5.30    AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.000
  TOTAL AREA(ACRES) =          5.3       PEAK FLOW RATE(CFS) =      11.65
*********************************************************************************
  FLOW PROCESS FROM NODE  31814.00 TO NODE  31815.00 IS CODE = 51
---------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    576.00  DOWNSTREAM(FEET) =    566.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   120.00   CHANNEL SLOPE = 0.0833
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       11.65
  FLOW VELOCITY(FEET/SEC.) =   5.76    FLOW DEPTH(FEET) =   0.82
  TRAVEL TIME(MIN.) =   0.35   Tc(MIN.) =    13.91
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31815.00 =    1023.00 FEET.
*********************************************************************************
  FLOW PROCESS FROM NODE  31815.00 TO NODE  31815.00 IS CODE = 81
---------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=================================================================================
```

```
   MAINLINE Tc(MIN.) =   13.91
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.703
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        3.10     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) =    3.10    SUBAREA RUNOFF(CFS) =    6.70
 EFFECTIVE AREA(ACRES) =      8.40   AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) =        8.4      PEAK FLOW RATE(CFS) =       18.16

*********************************************************************
  FLOW PROCESS FROM NODE  31815.00 TO NODE  31816.00 IS CODE = 51
--------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    566.00  DOWNSTREAM(FEET) =    544.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   218.00   CHANNEL SLOPE = 0.1009
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      18.16
  FLOW VELOCITY(FEET/SEC.) =   6.92   FLOW DEPTH(FEET) =   0.94
  TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =   14.44
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31816.00 =   1241.00 FEET.

*********************************************************************
  FLOW PROCESS FROM NODE  31816.00 TO NODE  31816.00 IS CODE = 81
--------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
====================================================================
  MAINLINE Tc(MIN.) =   14.44
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.647
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        1.10     0.30     1.000     -
  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) =    5.80    SUBAREA RUNOFF(CFS) =   12.25
 EFFECTIVE AREA(ACRES) =     14.20   AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) =       14.2      PEAK FLOW RATE(CFS) =       29.99

*********************************************************************
  FLOW PROCESS FROM NODE  31816.00 TO NODE  31817.00 IS CODE = 51
--------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    544.00  DOWNSTREAM(FEET) =    488.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   668.00   CHANNEL SLOPE = 0.0838
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      29.99
```

```
  FLOW VELOCITY(FEET/SEC.) =   7.28   FLOW DEPTH(FEET) =   1.17
  TRAVEL TIME(MIN.) =   1.53   Tc(MIN.) =   15.97
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31817.00 =   1909.00 FEET.

*********************************************************************
  FLOW PROCESS FROM NODE  31817.00 TO NODE  31817.00 IS CODE = 81
--------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
====================================================================
  MAINLINE Tc(MIN.) =   15.97
 *  25 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
  USER-DEFINED              -        0.10     0.30     1.000     -
  USER-DEFINED              -       12.40     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) =   12.50    SUBAREA RUNOFF(CFS) =   24.75
 EFFECTIVE AREA(ACRES) =     26.70   AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) =       26.7      PEAK FLOW RATE(CFS) =       52.87

*********************************************************************
  FLOW PROCESS FROM NODE  31817.00 TO NODE  31818.00 IS CODE = 51
--------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    488.00  DOWNSTREAM(FEET) =    442.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   580.00   CHANNEL SLOPE = 0.0793
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      52.87
  FLOW VELOCITY(FEET/SEC.) =   8.18   FLOW DEPTH(FEET) =   1.47
  TRAVEL TIME(MIN.) =   1.18   Tc(MIN.) =   17.15
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31818.00 =   2489.00 FEET.

*********************************************************************
  FLOW PROCESS FROM NODE  31818.00 TO NODE  31818.00 IS CODE = 81
--------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
====================================================================
  MAINLINE Tc(MIN.) =   17.15
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.401
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -        2.60     0.30     1.000     -
  USER-DEFINED              -       14.90     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) =   17.50    SUBAREA RUNOFF(CFS) =   33.09
 EFFECTIVE AREA(ACRES) =     44.20   AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) =       44.2      PEAK FLOW RATE(CFS) =       83.58

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

```
    FLOW PROCESS FROM NODE  31818.00 TO NODE  31819.00 IS CODE =  51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    442.00  DOWNSTREAM(FEET) =    410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   646.00   CHANNEL SLOPE = 0.0495
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      83.58
   FLOW VELOCITY(FEET/SEC.) =  7.70   FLOW DEPTH(FEET) =  1.90
   TRAVEL TIME(MIN.) =  1.40   Tc(MIN.) =  18.55
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31819.00 =   3135.00 FEET.
********************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =  18.55
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.297
   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             -         0.80      0.30      1.000      -
   USER-DEFINED             -         7.10      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) =    8.20      SUBAREA RUNOFF(CFS) =   14.74
   EFFECTIVE AREA(ACRES) =     52.40   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =     52.4      PEAK FLOW RATE(CFS) =      94.17

********************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31819.00 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.) =  18.55
   RAINFALL INTENSITY(INCH/HR) =   2.30
   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30
   AREA-AVERAGED Ap = 1.00
   EFFECTIVE STREAM AREA(ACRES) =     52.40
   TOTAL STREAM AREA(ACRES) =     52.40
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      94.17

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity  Fp(Fm)     Ap     Ae    HEADWATER
    NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)   NODE
       1     85.82  14.92   2.598   0.30( 0.30) 1.00    41.5   31800.00
       2     94.17  18.55   2.297   0.30( 0.30) 1.00    52.4   31810.00

   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    173.00  14.92   2.598   0.30( 0.30) 1.00    83.7   31800.00
       2    168.75  18.55   2.297   0.30( 0.30) 1.00    93.9   31810.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     173.00    Tc(MIN.) =    14.92
   EFFECTIVE AREA(ACRES) =       83.65   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =       93.9
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31819.00 =   3135.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  31819.00 TO NODE  31820.00 IS CODE =  51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    363.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1134.00   CHANNEL SLOPE = 0.0414
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
   CHANNEL FLOW THRU SUBAREA(CFS) =     173.00
   FLOW VELOCITY(FEET/SEC.) =  8.65   FLOW DEPTH(FEET) =  2.58
   TRAVEL TIME(MIN.) =  2.18   Tc(MIN.) =  17.11
   LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31820.00 =   4269.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  31820.00 TO NODE  31820.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =  17.11
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.404
   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             -         2.30      0.30      1.000      -
   USER-DEFINED             -         1.70      0.30      1.000      -
   USER-DEFINED             -         3.30      0.30      1.000      -
   USER-DEFINED             -         2.50      0.30      1.000      -
   USER-DEFINED             -         8.50      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) =   18.70      SUBAREA RUNOFF(CFS) =   35.42
   EFFECTIVE AREA(ACRES) =    102.35   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =      112.6      PEAK FLOW RATE(CFS) =     193.87

********************************************************************************
   FLOW PROCESS FROM NODE  31820.00 TO NODE  31820.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
```

```
  MAINLINE Tc(MIN.) =   17.11
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.404
  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              -        0.80       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) =    1.50     SUBAREA RUNOFF(CFS) =    2.84
  EFFECTIVE AREA(ACRES) =    103.85    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      114.1      PEAK FLOW RATE(CFS) =     196.71

******************************************************************************
  FLOW PROCESS FROM NODE  31820.00 TO NODE  31821.00 IS CODE = 51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    363.00  DOWNSTREAM(FEET) =     325.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   614.00   CHANNEL SLOPE =  0.0619
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      196.71
  FLOW VELOCITY(FEET/SEC.) = 10.38   FLOW DEPTH(FEET) =  2.51
  TRAVEL TIME(MIN.) =  0.99   Tc(MIN.) =   18.09
  LONGEST FLOWPATH FROM NODE  31810.00 TO NODE  31821.00 =   4883.00 FEET.


******************************************************************************
  FLOW PROCESS FROM NODE  31821.00 TO NODE  31821.00 IS CODE = 81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   18.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.329
  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              -        1.40       0.30       1.000      -
  USER-DEFINED              -        0.90       0.30       1.000      -
  USER-DEFINED              -        1.00       0.30       1.000      -
  USER-DEFINED              -        0.50       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) =    4.50     SUBAREA RUNOFF(CFS) =    8.22
  EFFECTIVE AREA(ACRES) =    108.35    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      118.6      PEAK FLOW RATE(CFS) =     197.91


******************************************************************************
  FLOW PROCESS FROM NODE  31821.00 TO NODE  31821.00 IS CODE = 81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
```

```
  MAINLINE Tc(MIN.) =   18.09
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.329
  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      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.20     SUBAREA RUNOFF(CFS) =    0.37
  EFFECTIVE AREA(ACRES) =    108.55    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      118.8      PEAK FLOW RATE(CFS) =     198.28
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)    =       118.8  TC(MIN.) =      18.09
  EFFECTIVE AREA(ACRES) =    108.55  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)  =      198.28

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae    HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR)  (INCH/HR)          (ACRES)   NODE
     1       198.28  18.09    2.329    0.30( 0.30) 1.00    108.6   31800.00
     2       192.39  21.74    2.099    0.30( 0.30) 1.00    118.8   31810.00
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
*****************************************************************
        RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2013 Advanced Engineering Software (aes)
            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                     Analysis prepared by:

                  Michael Baker International
                5 Hutton Center Drive, Suite 500
                        Santa Ana, CA
                           92707

 *************************** DESCRIPTION OF STUDY ***************************
 * RMV PA-4 WATERSHED 2 EXISTING CONDITION                                *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 100-YR EV DECEMBER 2018 JCLARK                                         *
 **************************************************************************

   FILE NAME: X40200EV.DAT
   TIME/DATE OF STUDY: 09:13 12/27/2018
 ================================================================================
   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   60.0     30.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  2   50.0     25.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  3   40.0     20.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  4   30.0     15.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  5   20.0     10.0     0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150

   GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
     1. Relative Flow-Depth =  0.00 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  40200.00 TO NODE  40201.00 IS CODE =  21
 ------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ========================================================================
```

```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   319.00
   ELEVATION DATA: UPSTREAM(FEET) =   647.00 DOWNSTREAM(FEET) =   555.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   9.085
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.440
   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
   "CHAPARRAL,BROADLEAF"      -        0.30     0.30     1.000     0   9.08
   NATURAL FAIR COVER
   "OPEN BRUSH"              -        0.20     0.30     1.000     0   9.08
   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) =      0.50   PEAK FLOW RATE(CFS) =      1.41

 **************************************************************************
   FLOW PROCESS FROM NODE  40201.00 TO NODE  40202.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   555.00 DOWNSTREAM(FEET) =   525.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  150.00   CHANNEL SLOPE = 0.2000
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      1.41
   FLOW VELOCITY(FEET/SEC.) =  4.67   FLOW DEPTH(FEET) =   0.32
   TRAVEL TIME(MIN.) =  0.54   Tc(MIN.) =   9.62
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40202.00 =   469.00 FEET.

 **************************************************************************
   FLOW PROCESS FROM NODE  40202.00 TO NODE  40202.00 IS CODE =  81
 ------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ========================================================================
   MAINLINE Tc(MIN.) =   9.62
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.331
   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               -       0.10     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) =   0.70       SUBAREA RUNOFF(CFS) =    1.91
   EFFECTIVE AREA(ACRES) =      1.20   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =       1.2       PEAK FLOW RATE(CFS) =      3.27

 **************************************************************************
   FLOW PROCESS FROM NODE  40202.00 TO NODE  40203.00 IS CODE =  51
 ------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =     505.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE = 0.1143
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       3.27
   FLOW VELOCITY(FEET/SEC.) =  4.67   FLOW DEPTH(FEET) =  0.48
   TRAVEL TIME(MIN.) =  0.62   Tc(MIN.) =  10.25
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40203.00 =    644.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  40203.00 TO NODE  40203.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   10.25
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.214
   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             -         0.10      0.30      1.000      -
   USER-DEFINED             -         0.40      0.30      1.000      -
   USER-DEFINED             -         0.10      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) =    0.70      SUBAREA RUNOFF(CFS) =    1.84
   EFFECTIVE AREA(ACRES) =     1.90   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       1.9      PEAK FLOW RATE(CFS) =       4.98

********************************************************************************
   FLOW PROCESS FROM NODE  40203.00 TO NODE  40204.00 IS CODE =  51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    505.00  DOWNSTREAM(FEET) =     493.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.0550
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       4.98
   FLOW VELOCITY(FEET/SEC.) =  3.98   FLOW DEPTH(FEET) =  0.65
   TRAVEL TIME(MIN.) =  0.91   Tc(MIN.) =  11.16
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40204.00 =    862.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  40204.00 TO NODE  40204.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   11.16
   * 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             -         0.20      0.30      1.000      -
   USER-DEFINED             -         0.10      0.30      1.000      -
```

```
   USER-DEFINED             -         0.30      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) =    1.40      SUBAREA RUNOFF(CFS) =    3.48
   EFFECTIVE AREA(ACRES) =     3.30   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       3.3      PEAK FLOW RATE(CFS) =       8.21

********************************************************************************
   FLOW PROCESS FROM NODE  40204.00 TO NODE  40205.00 IS CODE =  51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    493.00  DOWNSTREAM(FEET) =     472.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  218.00   CHANNEL SLOPE = 0.0963
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =       8.21
   FLOW VELOCITY(FEET/SEC.) =  5.51   FLOW DEPTH(FEET) =  0.70
   TRAVEL TIME(MIN.) =  0.66   Tc(MIN.) =  11.82
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40205.00 =   1080.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  40205.00 TO NODE  40205.00 IS CODE =  81
--------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =   11.82
   * 25 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             -         0.20      0.30      1.000      -
   USER-DEFINED             -         0.10      0.30      1.000      -
   USER-DEFINED             -         0.30      0.30      1.000      -
   USER-DEFINED             -         1.30      0.30      1.000      -
   USER-DEFINED             -         0.20      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) =    5.04
   EFFECTIVE AREA(ACRES) =     5.40   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       5.4      PEAK FLOW RATE(CFS) =      12.95

********************************************************************************
   FLOW PROCESS FROM NODE  40205.00 TO NODE  40206.00 IS CODE =  51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    472.00  DOWNSTREAM(FEET) =     455.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   71.00   CHANNEL SLOPE = 0.2394
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  1.00
   CHANNEL FLOW THRU SUBAREA(CFS) =      12.95
   FLOW VELOCITY(FEET/SEC.) =  8.69   FLOW DEPTH(FEET) =  0.70
```

```
   TRAVEL TIME(MIN.) =   0.14   Tc(MIN.) =   11.95
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40206.00 =   1151.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  40206.00 TO NODE  40206.00 IS CODE = 81
-----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=======================================================================
   MAINLINE Tc(MIN.) =   11.95
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.945
   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              -        0.30     0.30     1.000     -
   USER-DEFINED              -        0.20     0.30     1.000     -
   USER-DEFINED              -        1.10     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) =   3.80     SUBAREA RUNOFF(CFS) =    9.05
   EFFECTIVE AREA(ACRES) =     9.20   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =       9.2     PEAK FLOW RATE(CFS) =     21.90


***********************************************************************
   FLOW PROCESS FROM NODE  40206.00 TO NODE  40207.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   455.00  DOWNSTREAM(FEET) =    400.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   396.00   CHANNEL SLOPE = 0.1389
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =    21.90
   FLOW VELOCITY(FEET/SEC.) =   8.11   FLOW DEPTH(FEET) =   0.95
   TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =   12.77
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40207.00 =   1547.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  40207.00 TO NODE  40207.00 IS CODE = 81
-----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=======================================================================
   MAINLINE Tc(MIN.) =   12.77
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.838
   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              -        0.20     0.30     1.000     -
   USER-DEFINED              -        1.10     0.30     1.000     -
   USER-DEFINED              -        0.90     0.30     1.000     -
   USER-DEFINED              -        2.90     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) =      6.30     SUBAREA RUNOFF(CFS) =   14.39
   EFFECTIVE AREA(ACRES) =     15.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        15.5     PEAK FLOW RATE(CFS) =     35.40


***********************************************************************
   FLOW PROCESS FROM NODE  40207.00 TO NODE  40208.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   400.00  DOWNSTREAM(FEET) =    384.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   452.00   CHANNEL SLOPE = 0.0354
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
   CHANNEL FLOW THRU SUBAREA(CFS) =    35.40
   FLOW VELOCITY(FEET/SEC.) =   6.80   FLOW DEPTH(FEET) =   1.32
   TRAVEL TIME(MIN.) =   1.11   Tc(MIN.) =   13.87
   LONGEST FLOWPATH FROM NODE  40200.00 TO NODE  40208.00 =   1999.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE = 81
-----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=======================================================================
   MAINLINE Tc(MIN.) =   13.87
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.707
   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              -        0.90     0.30     1.000     -
   USER-DEFINED              -        1.70     0.30     1.000     -
   USER-DEFINED              -        0.10     0.30     1.000     -
   USER-DEFINED              -        0.20     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) =      3.00     SUBAREA RUNOFF(CFS) =    6.50
   EFFECTIVE AREA(ACRES) =     18.50   AREA-AVERAGED Fm(INCH/HR) = 0.30
   AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        18.5     PEAK FLOW RATE(CFS) =     40.08


***********************************************************************
   FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE = 81
-----------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=======================================================================
   MAINLINE Tc(MIN.) =   13.87
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.707
   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              -        1.30     0.30     1.000     -
   USER-DEFINED              -        1.60     0.30     1.000     -
   USER-DEFINED              -        0.90     0.30     1.000     -
   USER-DEFINED              -        2.10     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) =    7.20    SUBAREA RUNOFF(CFS) =   15.60
 EFFECTIVE AREA(ACRES) =     25.70    AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) =      25.7     PEAK FLOW RATE(CFS) =      55.68
*****************************************************************************
 FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE = 81
-----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
 MAINLINE Tc(MIN.) =   13.87
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.707
 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              -        0.20     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) =    2.80    SUBAREA RUNOFF(CFS) =    6.07
 EFFECTIVE AREA(ACRES) =     28.50    AREA-AVERAGED Fm(INCH/HR) = 0.30
 AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) =      28.5     PEAK FLOW RATE(CFS) =      61.74

*****************************************************************************
 FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE = 81
-----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
 MAINLINE Tc(MIN.) =   13.87
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.707
 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      0.100      -
 USER-DEFINED              -        0.10     0.30      0.500      -
 USER-DEFINED              -        1.60     0.30      1.000      -
 USER-DEFINED              -        1.20     0.30      1.000      -
 USER-DEFINED              -        0.20     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 = 0.852
 SUBAREA AREA(ACRES) =    4.60    SUBAREA RUNOFF(CFS) =   10.15
 EFFECTIVE AREA(ACRES) =     33.10    AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.98
 TOTAL AREA(ACRES) =      33.1     PEAK FLOW RATE(CFS) =      71.89

*****************************************************************************
 FLOW PROCESS FROM NODE  40208.00 TO NODE  40208.00 IS CODE = 81
-----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
=============================================================================
 MAINLINE Tc(MIN.) =   13.87
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.707
 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) =    0.87
 EFFECTIVE AREA(ACRES) =     33.50    AREA-AVERAGED Fm(INCH/HR) = 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.98
 TOTAL AREA(ACRES) =      33.5     PEAK FLOW RATE(CFS) =      72.76
=============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       33.5  TC(MIN.) =     13.87
 EFFECTIVE AREA(ACRES) =      33.50  AREA-AVERAGED Fm(INCH/HR)= 0.29
 AREA-AVERAGED Fp(INCH/HR) = 0.30  AREA-AVERAGED Ap = 0.980
 PEAK FLOW RATE(CFS)    =       72.76
=============================================================================

=============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
 _____
 ***********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
           (c) Copyright 1983-2013 Advanced Engineering Software (aes)
            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:




 *************************** DESCRIPTION OF STUDY ***************************
 * RMV PA-4 WATERSHED 3 EXISTING CONDITION                                *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                  *
 * 100-YR EV  AUGUST 2017 ROKAMOTO                                        *
 **************************************************************************

  FILE NAME: 0610403Y.DAT
  TIME/DATE OF STUDY: 08:40 08/02/2017
 ===========================================================================
  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  60.0    30.0     0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40300.00 TO NODE  40301.00 IS CODE = 21
 ---------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 ===========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   316.00
  ELEVATION DATA: UPSTREAM(FEET) =   790.00  DOWNSTREAM(FEET) =    720.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.541
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.346
  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
  "CHAPARRAL,BROADLEAF"     -        0.39     0.30     1.000    0   9.54
  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) =      0.39   PEAK FLOW RATE(CFS) =      1.08

 ***********************************************************************
  FLOW PROCESS FROM NODE  40301.00 TO NODE  40302.00 IS CODE = 51
 ---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =    675.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  191.00   CHANNEL SLOPE = 0.2356
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.240
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap   SCS
        LAND USE          GROUP     (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED             -        0.88     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) =     2.25
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.68
  AVERAGE FLOW DEPTH(FEET) =   0.36    TRAVEL TIME(MIN.) =   0.56
  Tc(MIN.) =   10.10
  SUBAREA AREA(ACRES) =     0.88      SUBAREA RUNOFF(CFS) =    2.34
  EFFECTIVE AREA(ACRES) =     1.28     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) =      3.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   FLOW VELOCITY(FEET/SEC.) =   6.26
  LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40302.00 =    507.00 FEET.

 ***********************************************************************
  FLOW PROCESS FROM NODE  40302.00 TO NODE  40303.00 IS CODE = 51
 ---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   675.00  DOWNSTREAM(FEET) =    625.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  179.00   CHANNEL SLOPE = 0.2793
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.165
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
    LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
 USER-DEFINED             -        0.84     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) =     4.46
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.01
 AVERAGE FLOW DEPTH(FEET) =  0.46   TRAVEL TIME(MIN.) =  0.43
 Tc(MIN.) =  10.53
 SUBAREA AREA(ACRES) =     0.84      SUBAREA RUNOFF(CFS) =    2.16
 EFFECTIVE AREA(ACRES) =     2.12     AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       2.1       PEAK FLOW RATE(CFS) =      5.45

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49   FLOW VELOCITY(FEET/SEC.) =  7.48
 LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40303.00 =   686.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40303.00 TO NODE  40304.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    625.00  DOWNSTREAM(FEET) =    557.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   161.00   CHANNEL SLOPE = 0.4224
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.120
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
     LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        2.94     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) =     9.19
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.97
  AVERAGE FLOW DEPTH(FEET) =  0.55   TRAVEL TIME(MIN.) =  0.27
  Tc(MIN.) =  10.80
  SUBAREA AREA(ACRES) =     2.94      SUBAREA RUNOFF(CFS) =    7.46
  EFFECTIVE AREA(ACRES) =     5.06     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       5.1       PEAK FLOW RATE(CFS) =     12.83

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.63   FLOW VELOCITY(FEET/SEC.) = 10.76
  LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40304.00 =   847.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40304.00 TO NODE  40305.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    557.00  DOWNSTREAM(FEET) =    548.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    42.00   CHANNEL SLOPE = 0.2143
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
```

```
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.107
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
     LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        1.68     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) =    14.95
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.67
  AVERAGE FLOW DEPTH(FEET) =  0.76   TRAVEL TIME(MIN.) =  0.08
  Tc(MIN.) =  10.88
  SUBAREA AREA(ACRES) =     1.68      SUBAREA RUNOFF(CFS) =    4.24
  EFFECTIVE AREA(ACRES) =     6.73     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       6.7       PEAK FLOW RATE(CFS) =     17.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.80   FLOW VELOCITY(FEET/SEC.) =  8.94
  LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40305.00 =   889.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40305.00 TO NODE  40306.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    548.00  DOWNSTREAM(FEET) =    515.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   217.00   CHANNEL SLOPE = 0.1521
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.040
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
     LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -        4.67     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) =    22.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.53
  AVERAGE FLOW DEPTH(FEET) =  0.94   TRAVEL TIME(MIN.) =  0.42
  Tc(MIN.) =  11.30
  SUBAREA AREA(ACRES) =     4.67      SUBAREA RUNOFF(CFS) =   11.53
  EFFECTIVE AREA(ACRES) =    11.41     AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      11.4       PEAK FLOW RATE(CFS) =     28.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.03   FLOW VELOCITY(FEET/SEC.) =  8.92
  LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40306.00 =  1106.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40306.00 TO NODE  40307.00 IS CODE = 51
---------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    515.00  DOWNSTREAM(FEET) =    502.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   180.00   CHANNEL SLOPE = 0.0722
```

```
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 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
   USER-DEFINED              -         8.44      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) =     38.31
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.30
   AVERAGE FLOW DEPTH(FEET) =  1.32   TRAVEL TIME(MIN.) =   0.41
   Tc(MIN.) =   11.71
   SUBAREA AREA(ACRES) =      8.44      SUBAREA RUNOFF(CFS) =   20.35
   EFFECTIVE AREA(ACRES) =     19.84      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      19.8         PEAK FLOW RATE(CFS) =      47.86

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.44   FLOW VELOCITY(FEET/SEC.) =  7.72
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40307.00 =   1286.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40307.00 TO NODE  40308.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    502.00  DOWNSTREAM(FEET) =    469.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   553.00   CHANNEL SLOPE = 0.0597
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 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              -        10.07      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) =     59.28
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.60
   AVERAGE FLOW DEPTH(FEET) =  1.61   TRAVEL TIME(MIN.) =   1.21
   Tc(MIN.) =   12.93
   SUBAREA AREA(ACRES) =     10.07      SUBAREA RUNOFF(CFS) =   22.83
   EFFECTIVE AREA(ACRES) =     29.92      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      29.9         PEAK FLOW RATE(CFS) =      67.80

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.70   FLOW VELOCITY(FEET/SEC.) =  7.85
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40308.00 =   1839.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40308.00 TO NODE  40309.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
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```
   ELEVATION DATA: UPSTREAM(FEET) =    469.00  DOWNSTREAM(FEET) =    433.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   631.00   CHANNEL SLOPE = 0.0571
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.667
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
   USER-DEFINED              -         9.09      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) =     77.48
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.99
   AVERAGE FLOW DEPTH(FEET) =  1.80   TRAVEL TIME(MIN.) =   1.32
   Tc(MIN.) =   14.24
   SUBAREA AREA(ACRES) =      9.09      SUBAREA RUNOFF(CFS) =   19.37
   EFFECTIVE AREA(ACRES) =     39.01      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      39.0         PEAK FLOW RATE(CFS) =      83.11

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.85   FLOW VELOCITY(FEET/SEC.) =  8.10
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40309.00 =   2470.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40309.00 TO NODE  40310.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    433.00  DOWNSTREAM(FEET) =    406.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   595.00   CHANNEL SLOPE = 0.0454
   CHANNEL BASE(FEET) =     0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 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
   USER-DEFINED              -        11.61      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) =     94.82
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.71
   AVERAGE FLOW DEPTH(FEET) =  2.02   TRAVEL TIME(MIN.) =   1.29
   Tc(MIN.) =   15.53
   SUBAREA AREA(ACRES) =     11.61      SUBAREA RUNOFF(CFS) =   23.41
   EFFECTIVE AREA(ACRES) =     50.62      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      50.6         PEAK FLOW RATE(CFS) =     102.05

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.08   FLOW VELOCITY(FEET/SEC.) =  7.86
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40310.00 =   3065.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40310.00 TO NODE  40311.00 IS CODE = 51
--------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    406.00  DOWNSTREAM(FEET) =     353.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1122.00   CHANNEL SLOPE = 0.0472
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.385
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        15.32     0.30      0.897     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.897
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    116.64
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.22
   AVERAGE FLOW DEPTH(FEET) =  1.95   TRAVEL TIME(MIN.) =   1.83
   Tc(MIN.) =  17.36
   SUBAREA AREA(ACRES) =   15.32      SUBAREA RUNOFF(CFS) =   29.17
   EFFECTIVE AREA(ACRES) =    65.94     AREA-AVERAGED Fm(INCH/HR) =  0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  0.98
   TOTAL AREA(ACRES) =       65.9       PEAK FLOW RATE(CFS) =     124.16

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  2.00   FLOW VELOCITY(FEET/SEC.) = 10.39
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40311.00 =    4187.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  40311.00 TO NODE  40312.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    353.00  DOWNSTREAM(FEET) =     337.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  712.00   CHANNEL SLOPE = 0.0225
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.279
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         7.65     0.30      0.850     -
   USER-DEFINED              -         4.40     0.30      1.000     -
   USER-DEFINED              -         0.89     0.30      0.100     -
   USER-DEFINED              -         6.82     0.30      0.850     -
   USER-DEFINED              -         5.04     0.30      1.000     -
   USER-DEFINED              -         1.11     0.30      1.000     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.885
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    147.64
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.22
   AVERAGE FLOW DEPTH(FEET) =  2.45   TRAVEL TIME(MIN.) =   1.44
   Tc(MIN.) =  18.80
   SUBAREA AREA(ACRES) =   25.91      SUBAREA RUNOFF(CFS) =   46.96
   EFFECTIVE AREA(ACRES) =    91.85     AREA-AVERAGED Fm(INCH/HR) =  0.29
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  0.95
   TOTAL AREA(ACRES) =       91.8       PEAK FLOW RATE(CFS) =     164.87

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:

   DEPTH(FEET) =  2.55   FLOW VELOCITY(FEET/SEC.) =   8.43
   LONGEST FLOWPATH FROM NODE  40300.00 TO NODE  40312.00 =    4899.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =  18.80
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.279
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         0.04     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) =    0.04      SUBAREA RUNOFF(CFS) =    0.07
   EFFECTIVE AREA(ACRES) =    91.89   AREA-AVERAGED Fm(INCH/HR) =  0.29
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.95
   TOTAL AREA(ACRES) =       91.9       PEAK FLOW RATE(CFS) =     164.94

***********************************************************************
   FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =  18.80
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.279
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         1.17     0.30      0.850     -
   USER-DEFINED              -         0.01     0.30      1.000     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.851
   SUBAREA AREA(ACRES) =    1.18      SUBAREA RUNOFF(CFS) =    2.15
   EFFECTIVE AREA(ACRES) =    93.07   AREA-AVERAGED Fm(INCH/HR) =  0.28
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.95
   TOTAL AREA(ACRES) =       93.1       PEAK FLOW RATE(CFS) =     167.09

***********************************************************************
   FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE = 81
-------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   MAINLINE Tc(MIN.) =  18.80
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.279
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         0.18     0.30      1.000     -
   USER-DEFINED              -         4.59     0.30      1.000     -
   USER-DEFINED              -         4.27     0.30      0.850     -
   USER-DEFINED              -         3.00     0.30      1.000     -
   USER-DEFINED              -         0.16     0.30      1.000     -
   USER-DEFINED              -         0.22     0.30      0.100     -
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.932
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  SUBAREA AREA(ACRES) =   12.42     SUBAREA RUNOFF(CFS) =   22.35
  EFFECTIVE AREA(ACRES) =    105.49   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      105.5      PEAK FLOW RATE(CFS) =     189.44

*******************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =   18.80
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.279
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       2.55      0.30     1.000      -
  USER-DEFINED              -      10.49      0.30     1.000      -
  USER-DEFINED              -       2.87      0.30     0.850      -
  USER-DEFINED              -       3.70      0.30     1.000      -
  USER-DEFINED              -       3.12      0.30     1.000      -
  USER-DEFINED              -       0.54      0.30     1.000      -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.981
  SUBAREA AREA(ACRES) =   23.27     SUBAREA RUNOFF(CFS) =   41.57
  EFFECTIVE AREA(ACRES) =    128.76   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      128.8      PEAK FLOW RATE(CFS) =     231.01

*******************************************************************************
  FLOW PROCESS FROM NODE  40312.00 TO NODE  40312.00 IS CODE =  81
-------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
  MAINLINE Tc(MIN.) =   18.80
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.279
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp        Ap      SCS
      LAND USE            GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED              -       2.13      0.30     1.000      -
  USER-DEFINED              -       0.01      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) =    2.14     SUBAREA RUNOFF(CFS) =    3.81
  EFFECTIVE AREA(ACRES) =    130.90   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      130.9      PEAK FLOW RATE(CFS) =     234.83
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      130.9  TC(MIN.) =     18.80
  EFFECTIVE AREA(ACRES) =    130.90  AREA-AVERAGED Fm(INCH/HR)=  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.954
  PEAK FLOW RATE(CFS)   =     234.83
===============================================================================
===============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
****************************************************************
        RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2013 Advanced Engineering Software (aes)
          Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                     Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
 * RMV PA-4 WATERSHED 4 EXISTING CONDITION                              *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                *
 * 100-YR EV  AUGUST 2017 ROKAMOTO                                      *
 **************************************************************************

  FILE NAME: 0610404Y.DAT
  TIME/DATE OF STUDY: 08:54 08/02/2017
====================================================================
  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  60.0    30.0     0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  2  50.0    25.0     0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  3  40.0    20.0     0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  4  30.0    15.0     0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150
  5  20.0    10.0     0.020/0.020/0.020  0.67  2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40400.00 TO NODE  40401.00 IS CODE = 21
----------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
====================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   327.00
  ELEVATION DATA: UPSTREAM(FEET) =   928.00  DOWNSTREAM(FEET) =   750.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   8.081
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.676
  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
  "CHAPARRAL,BROADLEAF"    -         0.75    0.30    1.000    0    8.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.28
  TOTAL AREA(ACRES) =       0.75   PEAK FLOW RATE(CFS) =       2.28

****************************************************************
  FLOW PROCESS FROM NODE  40401.00 TO NODE  40402.00 IS CODE = 51
----------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   750.00  DOWNSTREAM(FEET) =   710.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  107.00   CHANNEL SLOPE = 0.3738
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.618
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap    SCS
        LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED             -        1.17     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) =     4.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.75
  AVERAGE FLOW DEPTH(FEET) =   0.42    TRAVEL TIME(MIN.) =   0.23
  Tc(MIN.) =    8.31
  SUBAREA AREA(ACRES) =     1.17       SUBAREA RUNOFF(CFS) =    3.51
  EFFECTIVE AREA(ACRES) =     1.93      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.9        PEAK FLOW RATE(CFS) =      5.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48    FLOW VELOCITY(FEET/SEC.) =   8.40
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40402.00 =    434.00 FEET.

****************************************************************
  FLOW PROCESS FROM NODE  40402.00 TO NODE  40403.00 IS CODE = 51
----------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
====================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.00  DOWNSTREAM(FEET) =   675.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  127.00   CHANNEL SLOPE = 0.2756
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.554
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
    LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
 USER-DEFINED             -        1.05     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) =       7.29
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.97
 AVERAGE FLOW DEPTH(FEET) =  0.55   TRAVEL TIME(MIN.) =   0.27
 Tc(MIN.) =   8.58
 SUBAREA AREA(ACRES) =    1.05      SUBAREA RUNOFF(CFS) =    3.07
 EFFECTIVE AREA(ACRES) =     2.97    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) =       8.71

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.59   FLOW VELOCITY(FEET/SEC.) =   8.33
 LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40403.00 =    561.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  40403.00 TO NODE  40404.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    675.00  DOWNSTREAM(FEET) =    650.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   113.00   CHANNEL SLOPE = 0.2212
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.502
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
    LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
 USER-DEFINED             -        1.95     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) =      11.52
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.26
 AVERAGE FLOW DEPTH(FEET) =  0.68   TRAVEL TIME(MIN.) =   0.23
 Tc(MIN.) =   8.80
 SUBAREA AREA(ACRES) =    1.95      SUBAREA RUNOFF(CFS) =    5.62
 EFFECTIVE AREA(ACRES) =     4.92    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        4.9      PEAK FLOW RATE(CFS) =      14.19

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.74   FLOW VELOCITY(FEET/SEC.) =   8.70
 LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40404.00 =    674.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  40404.00 TO NODE  40405.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    610.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   219.00   CHANNEL SLOPE = 0.1826
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00

 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.409
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp       Ap      SCS
    LAND USE            GROUP     (ACRES) (INCH/HR) (DECIMAL)   CN
 USER-DEFINED             -        2.15     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) =      17.19
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.50
 AVERAGE FLOW DEPTH(FEET) =  0.82   TRAVEL TIME(MIN.) =   0.43
 Tc(MIN.) =   9.23
 SUBAREA AREA(ACRES) =    2.15      SUBAREA RUNOFF(CFS) =    6.00
 EFFECTIVE AREA(ACRES) =     7.07    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        7.1      PEAK FLOW RATE(CFS) =      19.78

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.87   FLOW VELOCITY(FEET/SEC.) =   8.77
 LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40405.00 =    893.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  40405.00 TO NODE  40406.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    610.00  DOWNSTREAM(FEET) =    605.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    43.00   CHANNEL SLOPE = 0.1163
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
 * 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             -        2.90     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) =      23.81
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.75
 AVERAGE FLOW DEPTH(FEET) =  1.01   TRAVEL TIME(MIN.) =   0.09
 Tc(MIN.) =   9.33
 SUBAREA AREA(ACRES) =    2.90      SUBAREA RUNOFF(CFS) =    8.07
 EFFECTIVE AREA(ACRES) =     9.97    AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       10.0      PEAK FLOW RATE(CFS) =      27.72

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.07   FLOW VELOCITY(FEET/SEC.) =   8.06
 LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40406.00 =    936.00 FEET.

*****************************************************************************
 FLOW PROCESS FROM NODE  40406.00 TO NODE  40407.00 IS CODE = 51
---------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    602.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    52.00   CHANNEL SLOPE = 0.0577
```

```
   CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.363
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        4.51      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) =     33.94
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.52
   AVERAGE FLOW DEPTH(FEET) =  1.32    TRAVEL TIME(MIN.) =   0.13
   Tc(MIN.) =    9.46
   SUBAREA AREA(ACRES) =     4.51       SUBAREA RUNOFF(CFS) =   12.43
   EFFECTIVE AREA(ACRES) =     14.48      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      14.5         PEAK FLOW RATE(CFS) =      39.91

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.40    FLOW VELOCITY(FEET/SEC.) =  6.80
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40407.00 =    988.00 FEET.

**********************************************************************
   FLOW PROCESS FROM NODE  40407.00 TO NODE  40408.00 IS CODE = 51
----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    602.00  DOWNSTREAM(FEET) =     559.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   533.00   CHANNEL SLOPE =  0.0807
   CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  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
   USER-DEFINED              -        5.99      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) =     47.61
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.02
   AVERAGE FLOW DEPTH(FEET) =  1.41    TRAVEL TIME(MIN.) =   1.11
   Tc(MIN.) =   10.57
   SUBAREA AREA(ACRES) =     5.99       SUBAREA RUNOFF(CFS) =   15.40
   EFFECTIVE AREA(ACRES) =     20.47      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      20.5         PEAK FLOW RATE(CFS) =      52.65

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.46    FLOW VELOCITY(FEET/SEC.) =  8.23
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40408.00 =   1521.00 FEET.

**********************************************************************
   FLOW PROCESS FROM NODE  40408.00 TO NODE  40409.00 IS CODE = 51
----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    559.00  DOWNSTREAM(FEET) =     509.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   702.00   CHANNEL SLOPE =  0.0712
   CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  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              -        6.05      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) =     59.83
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.12
   AVERAGE FLOW DEPTH(FEET) =  1.57    TRAVEL TIME(MIN.) =   1.44
   Tc(MIN.) =   12.01
   SUBAREA AREA(ACRES) =     6.05       SUBAREA RUNOFF(CFS) =   14.36
   EFFECTIVE AREA(ACRES) =     26.51      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      26.5         PEAK FLOW RATE(CFS) =      62.95

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.60    FLOW VELOCITY(FEET/SEC.) =  8.22
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40409.00 =   2223.00 FEET.

**********************************************************************
   FLOW PROCESS FROM NODE  40409.00 TO NODE  40447.00 IS CODE = 51
----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    509.00  DOWNSTREAM(FEET) =     482.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   440.00   CHANNEL SLOPE =  0.0614
   CHANNEL BASE(FEET) =     0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 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              -        6.09      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) =     69.85
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.00
   AVERAGE FLOW DEPTH(FEET) =  1.71    TRAVEL TIME(MIN.) =   0.92
   Tc(MIN.) =   12.92
   SUBAREA AREA(ACRES) =     6.09       SUBAREA RUNOFF(CFS) =   13.79
   EFFECTIVE AREA(ACRES) =     32.60      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      32.6         PEAK FLOW RATE(CFS) =      73.88

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.74    FLOW VELOCITY(FEET/SEC.) =  8.11
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =   2663.00 FEET.

**********************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 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.) =  12.92
  RAINFALL INTENSITY(INCH/HR) =   2.82
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap = 1.00
  EFFECTIVE STREAM AREA(ACRES) =      32.60
  TOTAL STREAM AREA(ACRES) =      32.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      73.88

*************************************************************************
  FLOW PROCESS FROM NODE  40410.00 TO NODE  40411.00 IS CODE = 21
-------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=============================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
  ELEVATION DATA: UPSTREAM(FEET) =    878.00  DOWNSTREAM(FEET) =    726.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   8.371
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) =   3.603
  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
  "CHAPARRAL,BROADLEAF"     -       0.69     0.30     1.000     0    8.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      2.04
  TOTAL AREA(ACRES) =      0.69   PEAK FLOW RATE(CFS) =      2.04

*************************************************************************
  FLOW PROCESS FROM NODE  40411.00 TO NODE  40412.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================
  ELEVATION DATA: UPSTREAM(FEET) =    726.00  DOWNSTREAM(FEET) =    687.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   101.00   CHANNEL SLOPE = 0.3861
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) =   3.550
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap     SCS
       LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       0.91     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) =      3.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.53
  AVERAGE FLOW DEPTH(FEET) =   0.39   TRAVEL TIME(MIN.) =   0.22
  Tc(MIN.) =   8.59
  SUBAREA AREA(ACRES) =      0.91      SUBAREA RUNOFF(CFS) =   2.66
  EFFECTIVE AREA(ACRES) =      1.60      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
```

```
  TOTAL AREA(ACRES) =       1.6      PEAK FLOW RATE(CFS) =      4.67

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   FLOW VELOCITY(FEET/SEC.) =   8.12
  LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40412.00 =     430.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40412.00 TO NODE  40413.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================
  ELEVATION DATA: UPSTREAM(FEET) =    687.00  DOWNSTREAM(FEET) =    658.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   153.00   CHANNEL SLOPE = 0.1895
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) =   3.463
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap     SCS
       LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       0.96     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) =      6.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.59
  AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   0.39
  Tc(MIN.) =   8.98
  SUBAREA AREA(ACRES) =      0.96      SUBAREA RUNOFF(CFS) =   2.72
  EFFECTIVE AREA(ACRES) =      2.55      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) =      7.26

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.59   FLOW VELOCITY(FEET/SEC.) =   6.95
  LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40413.00 =     583.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40413.00 TO NODE  40414.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=============================================================
  ELEVATION DATA: UPSTREAM(FEET) =    658.00  DOWNSTREAM(FEET) =    615.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   247.00   CHANNEL SLOPE = 0.1741
  CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) =   3.346
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp        Ap     SCS
       LAND USE            GROUP   (ACRES) (INCH/HR) (DECIMAL)  CN
  USER-DEFINED             -       2.51     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) =     10.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.34
  AVERAGE FLOW DEPTH(FEET) =   0.70   TRAVEL TIME(MIN.) =   0.56
  Tc(MIN.) =   9.54
  SUBAREA AREA(ACRES) =      2.51      SUBAREA RUNOFF(CFS) =   6.88
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  EFFECTIVE AREA(ACRES) =      5.06     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =          5.1      PEAK FLOW RATE(CFS) =      13.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.77   FLOW VELOCITY(FEET/SEC.) =   7.89
  LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40414.00 =     830.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  40414.00 TO NODE  40415.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    567.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   414.00   CHANNEL SLOPE =  0.1159
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.173
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        4.38     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) =      19.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.35
  AVERAGE FLOW DEPTH(FEET) =   0.94   TRAVEL TIME(MIN.) =   0.94
  Tc(MIN.) =   10.48
  SUBAREA AREA(ACRES) =     4.38      SUBAREA RUNOFF(CFS) =   11.32
  EFFECTIVE AREA(ACRES) =      9.44     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =          9.4      PEAK FLOW RATE(CFS) =      24.41

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.02   FLOW VELOCITY(FEET/SEC.) =   7.83
  LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40415.00 =    1244.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  40415.00 TO NODE  40416.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    567.00  DOWNSTREAM(FEET) =    538.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   301.00   CHANNEL SLOPE =  0.0963
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.069
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -        7.77     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) =      34.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.88
  AVERAGE FLOW DEPTH(FEET) =   1.20   TRAVEL TIME(MIN.) =   0.64
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  Tc(MIN.) =   11.12
  SUBAREA AREA(ACRES) =     7.77      SUBAREA RUNOFF(CFS) =   19.36
  EFFECTIVE AREA(ACRES) =     17.21     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) =      42.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.31   FLOW VELOCITY(FEET/SEC.) =   8.36
  LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40416.00 =    1545.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  40416.00 TO NODE  40417.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    538.00  DOWNSTREAM(FEET) =    529.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   116.00   CHANNEL SLOPE =  0.0776
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.034
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp        Ap      SCS
       LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
  USER-DEFINED               -       16.20     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) =      62.81
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.51
  AVERAGE FLOW DEPTH(FEET) =   1.57   TRAVEL TIME(MIN.) =   0.23
  Tc(MIN.) =   11.34
  SUBAREA AREA(ACRES) =    16.20      SUBAREA RUNOFF(CFS) =   39.87
  EFFECTIVE AREA(ACRES) =     33.41     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =         33.4      PEAK FLOW RATE(CFS) =      82.21

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.74   FLOW VELOCITY(FEET/SEC.) =   9.09
  LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40417.00 =    1661.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE  40417.00 TO NODE  40447.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    529.00  DOWNSTREAM(FEET) =    482.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   891.00   CHANNEL SLOPE =  0.0527
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  * 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               -       14.55     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) =      98.52
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     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.24
     AVERAGE FLOW DEPTH(FEET) =  2.00    TRAVEL TIME(MIN.) =   1.80
     Tc(MIN.) =   13.15
     SUBAREA AREA(ACRES) =    14.55      SUBAREA RUNOFF(CFS) =   32.61
     EFFECTIVE AREA(ACRES) =     47.96      AREA-AVERAGED Fm(INCH/HR) =   0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =        48.0          PEAK FLOW RATE(CFS) =      107.52

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) =  2.06    FLOW VELOCITY(FEET/SEC.) =   8.41
     LONGEST FLOWPATH FROM NODE  40410.00 TO NODE  40447.00 =    2552.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 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.) =   13.15
   RAINFALL INTENSITY(INCH/HR) =   2.79
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =      47.96
   TOTAL STREAM AREA(ACRES) =       47.96
   PEAK FLOW RATE(CFS) AT CONFLUENCE =       107.52

   ** CONFLUENCE DATA **
   STREAM      Q       Tc    Intensity   Fp(Fm)    Ap     Ae     HEADWATER
   NUMBER    (CFS)   (MIN.) (INCH/HR)  (INCH/HR)        (ACRES)    NODE
     1       73.88   12.92    2.818   0.30( 0.30) 1.00     32.6   40400.00
     2      107.52   13.15    2.791   0.30( 0.30) 1.00     48.0   40410.00

   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      180.74   12.92    2.818   0.30( 0.30) 1.00     79.7   40400.00
     2      180.61   13.15    2.791   0.30( 0.30) 1.00     80.6   40410.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      180.74    Tc(MIN.) =   12.92
   EFFECTIVE AREA(ACRES) =      79.75   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       80.6
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE =   10
--------------------------------------------------------------------------------
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
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     FLOW PROCESS FROM NODE  40420.00 TO NODE  40421.00 IS CODE =  21
--------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  321.00
   ELEVATION DATA: UPSTREAM(FEET) =   925.00 DOWNSTREAM(FEET) =    815.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.799
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.503
   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
   "CHAPARRAL,BROADLEAF"      -        0.31     0.30     1.000    0    8.80
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =      0.89
   TOTAL AREA(ACRES) =        0.31   PEAK FLOW RATE(CFS) =        0.89

********************************************************************************
   FLOW PROCESS FROM NODE  40421.00 TO NODE  40422.00 IS CODE = 51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   815.00 DOWNSTREAM(FEET) =    743.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   123.00    CHANNEL SLOPE = 0.5854
   CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 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
   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
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        1.31
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.03
   AVERAGE FLOW DEPTH(FEET) =  0.25    TRAVEL TIME(MIN.) =   0.29
   Tc(MIN.) =    9.09
   SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.84
   EFFECTIVE AREA(ACRES) =      0.60      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        0.6          PEAK FLOW RATE(CFS) =       1.71

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.28    FLOW VELOCITY(FEET/SEC.) =   7.39
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40422.00 =     444.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  40422.00 TO NODE  40423.00 IS CODE = 51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =   743.00  DOWNSTREAM(FEET) =    665.00
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   CHANNEL LENGTH THRU SUBAREA(FEET) =   142.00   CHANNEL SLOPE = 0.5493
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  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
    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
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.82
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.19
   AVERAGE FLOW DEPTH(FEET) =   0.34   TRAVEL TIME(MIN.) =   0.29
   Tc(MIN.) =    9.38
   SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    2.22
   EFFECTIVE AREA(ACRES) =     1.40     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       3.89

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.38   FLOW VELOCITY(FEET/SEC.) = 8.79
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40423.00 =    586.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  40423.00 TO NODE  40424.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    665.00  DOWNSTREAM(FEET) =    630.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   99.00   CHANNEL SLOPE = 0.3535
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.336
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED             -        0.32     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) =      4.33
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.73
   AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   0.21
   Tc(MIN.) =    9.59
   SUBAREA AREA(ACRES) =     0.32       SUBAREA RUNOFF(CFS) =    0.87
   EFFECTIVE AREA(ACRES) =     1.72     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap = 1.00
   TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       4.71

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.45   FLOW VELOCITY(FEET/SEC.) =  7.85
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40424.00 =    685.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  40424.00 TO NODE  40425.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    615.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   35.00   CHANNEL SLOPE = 0.4286
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.324
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED             -        1.87     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) =      7.25
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.43
   AVERAGE FLOW DEPTH(FEET) =   0.51   TRAVEL TIME(MIN.) =   0.06
   Tc(MIN.) =    9.66
   SUBAREA AREA(ACRES) =     1.87       SUBAREA RUNOFF(CFS) =    5.08
   EFFECTIVE AREA(ACRES) =     3.59     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) =       9.77

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.57   FLOW VELOCITY(FEET/SEC.) = 10.12
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40425.00 =    720.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  40425.00 TO NODE  40426.00 IS CODE = 51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    615.00  DOWNSTREAM(FEET) =    574.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   260.00   CHANNEL SLOPE = 0.1577
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.213
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
         LAND USE          GROUP    (ACRES)  (INCH/HR) (DECIMAL)  CN
    USER-DEFINED             -        1.19     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) =     11.33
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.25
   AVERAGE FLOW DEPTH(FEET) =   0.72   TRAVEL TIME(MIN.) =   0.60
   Tc(MIN.) =   10.25
   SUBAREA AREA(ACRES) =     1.19       SUBAREA RUNOFF(CFS) =    3.12
   EFFECTIVE AREA(ACRES) =     4.78     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =      12.53

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.75   FLOW VELOCITY(FEET/SEC.) =  7.42
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40426.00 =    980.00 FEET.

***********************************************************************
   FLOW PROCESS FROM NODE  40426.00 TO NODE  40427.00 IS CODE = 51
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```
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =    533.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   322.00   CHANNEL SLOPE = 0.1273
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.086
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        1.82      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) =      14.81
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.09
   AVERAGE FLOW DEPTH(FEET) =   0.83   TRAVEL TIME(MIN.) =   0.76
   Tc(MIN.) =   11.01
   SUBAREA AREA(ACRES) =     1.82      SUBAREA RUNOFF(CFS) =    4.56
   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) =     16.55

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.87   FLOW VELOCITY(FEET/SEC.) =   7.34
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40427.00 =   1302.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE  40427.00 TO NODE  40428.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    533.00  DOWNSTREAM(FEET) =    521.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE = 0.0750
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.024
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA        Fp        Ap      SCS
        LAND USE            GROUP    (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -        6.79      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) =      24.87
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.65
   AVERAGE FLOW DEPTH(FEET) =   1.12   TRAVEL TIME(MIN.) =   0.40
   Tc(MIN.) =   11.41
   SUBAREA AREA(ACRES) =     6.79      SUBAREA RUNOFF(CFS) =   16.65
   EFFECTIVE AREA(ACRES) =     13.39    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) =     32.82

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.24   FLOW VELOCITY(FEET/SEC.) =   7.13
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40428.00 =   1462.00 FEET.

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   FLOW PROCESS FROM NODE  40428.00 TO NODE  40429.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    521.00  DOWNSTREAM(FEET) =    508.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   221.00   CHANNEL SLOPE = 0.0588
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 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
   USER-DEFINED              -        3.74      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) =      37.28
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.71
   AVERAGE FLOW DEPTH(FEET) =   1.36   TRAVEL TIME(MIN.) =   0.55
   Tc(MIN.) =   11.96
   SUBAREA AREA(ACRES) =     3.74      SUBAREA RUNOFF(CFS) =    8.91
   EFFECTIVE AREA(ACRES) =     17.13    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      17.1        PEAK FLOW RATE(CFS) =     40.77

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.41   FLOW VELOCITY(FEET/SEC.) =   6.87
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40429.00 =   1683.00 FEET.

*******************************************************************************
   FLOW PROCESS FROM NODE  40429.00 TO NODE  40446.00 IS CODE = 51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    508.00  DOWNSTREAM(FEET) =    489.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   306.00   CHANNEL SLOPE = 0.0621
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 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              -        0.99      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) =      41.91
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.06
   AVERAGE FLOW DEPTH(FEET) =   1.41   TRAVEL TIME(MIN.) =   0.72
   Tc(MIN.) =   12.68
   SUBAREA AREA(ACRES) =     0.99      SUBAREA RUNOFF(CFS) =    2.27
   EFFECTIVE AREA(ACRES) =     18.12    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =      18.1        PEAK FLOW RATE(CFS) =     41.56

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.40   FLOW VELOCITY(FEET/SEC.) =   7.06
   LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =   1989.00 FEET.
```

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********************************************************************************
   FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE =  10
--------------------------------------------------------------------------------
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
================================================================================


********************************************************************************
   FLOW PROCESS FROM NODE  40430.00 TO NODE  40431.00 IS CODE =  21
--------------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   302.00
   ELEVATION DATA: UPSTREAM(FEET) =   1035.00  DOWNSTREAM(FEET) =    875.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.870
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.731
   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
   "CHAPARRAL,BROADLEAF"      -        0.40      0.30     1.000    0    7.87
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
   SUBAREA RUNOFF(CFS) =      1.25
   TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.25

********************************************************************************
   FLOW PROCESS FROM NODE  40431.00 TO NODE  40432.00 IS CODE =  51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    875.00  DOWNSTREAM(FEET) =    800.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   160.00   CHANNEL SLOPE = 0.4688
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.637
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        0.65      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) =      2.22
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.34
   AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   0.36
   Tc(MIN.) =    8.23
   SUBAREA AREA(ACRES) =     0.65      SUBAREA RUNOFF(CFS) =    1.95
   EFFECTIVE AREA(ACRES) =      1.05     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) =      3.16

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.36   FLOW VELOCITY(FEET/SEC.) = 7.98
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40432.00 =    462.00 FEET.
```

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********************************************************************************
   FLOW PROCESS FROM NODE  40432.00 TO NODE  40433.00 IS CODE =  51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    712.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   150.00   CHANNEL SLOPE = 0.5867
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.573
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        1.08      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) =      4.75
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.56
   AVERAGE FLOW DEPTH(FEET) =   0.41   TRAVEL TIME(MIN.) =   0.26
   Tc(MIN.) =    8.50
   SUBAREA AREA(ACRES) =     1.08      SUBAREA RUNOFF(CFS) =    3.19
   EFFECTIVE AREA(ACRES) =      2.13     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       2.1       PEAK FLOW RATE(CFS) =      6.29

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.45   FLOW VELOCITY(FEET/SEC.) = 10.21
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40433.00 =    612.00 FEET.

********************************************************************************
   FLOW PROCESS FROM NODE  40433.00 TO NODE  40434.00 IS CODE =  51
--------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    712.00  DOWNSTREAM(FEET) =    657.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   120.00   CHANNEL SLOPE = 0.4583
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.528
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
       LAND USE            GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        1.98      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) =      9.16
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.23
   AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   0.20
   Tc(MIN.) =    8.69
   SUBAREA AREA(ACRES) =     1.98      SUBAREA RUNOFF(CFS) =    5.75
   EFFECTIVE AREA(ACRES) =      4.11     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =       4.1       PEAK FLOW RATE(CFS) =     11.95

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
   DEPTH(FEET) =  0.61   FLOW VELOCITY(FEET/SEC.) =  10.87
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40434.00 =     732.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  40434.00 TO NODE  40435.00 IS CODE =  51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    657.00  DOWNSTREAM(FEET) =    620.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  161.00   CHANNEL SLOPE = 0.2298
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.461
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -          2.34      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) =      15.28
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.00
   AVERAGE FLOW DEPTH(FEET) =  0.75   TRAVEL TIME(MIN.) =  0.30
   Tc(MIN.) =    8.99
   SUBAREA AREA(ACRES) =    2.34      SUBAREA RUNOFF(CFS) =    6.66
   EFFECTIVE AREA(ACRES) =    6.46     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) =     18.37

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.81   FLOW VELOCITY(FEET/SEC.) =  9.43
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40435.00 =     893.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  40435.00 TO NODE  40445.00 IS CODE =  51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =    579.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  358.00   CHANNEL SLOPE = 0.1145
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.297
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -          1.75      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) =      20.73
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.43
   AVERAGE FLOW DEPTH(FEET) =  0.96   TRAVEL TIME(MIN.) =  0.80
   Tc(MIN.) =    9.79
   SUBAREA AREA(ACRES) =    1.75      SUBAREA RUNOFF(CFS) =    4.73
   EFFECTIVE AREA(ACRES) =    8.21     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       8.2        PEAK FLOW RATE(CFS) =     22.15
```

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   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.99   FLOW VELOCITY(FEET/SEC.) =  7.58
   LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40445.00 =    1251.00 FEET.


***********************************************************************
   FLOW PROCESS FROM NODE  40445.00 TO NODE  40445.00 IS CODE =   1
-----------------------------------------------------------------------
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
=======================================================================
   TOTAL NUMBER OF STREAMS = 2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
   TIME OF CONCENTRATION(MIN.) =    9.79
   RAINFALL INTENSITY(INCH/HR) =   3.30
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =      8.21
   TOTAL STREAM AREA(ACRES) =        8.21
   PEAK FLOW RATE(CFS) AT CONFLUENCE =       22.15


***********************************************************************
   FLOW PROCESS FROM NODE  40440.00 TO NODE  40441.00 IS CODE =  21
-----------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=======================================================================
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  319.00
   ELEVATION DATA: UPSTREAM(FEET) =   1020.00  DOWNSTREAM(FEET) =    898.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.586
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.552
   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
   "CHAPARRAL,BROADLEAF"     -          0.75      0.30     1.000     0   8.59
   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) =       0.75   PEAK FLOW RATE(CFS) =      2.20


***********************************************************************
   FLOW PROCESS FROM NODE  40441.00 TO NODE  40442.00 IS CODE =  51
-----------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    898.00  DOWNSTREAM(FEET) =    760.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  253.00   CHANNEL SLOPE = 0.5455
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.440
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -          0.89      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) =      3.45
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.44
 AVERAGE FLOW DEPTH(FEET) =   0.37    TRAVEL TIME(MIN.) =   0.50
 Tc(MIN.) =    9.09
 SUBAREA AREA(ACRES) =      0.89      SUBAREA RUNOFF(CFS) =    2.51
 EFFECTIVE AREA(ACRES) =     1.64     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       1.6        PEAK FLOW RATE(CFS) =       4.63

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41    FLOW VELOCITY(FEET/SEC.) =  9.22
 LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40442.00 =    572.00 FEET.

***********************************************************************
 FLOW PROCESS FROM NODE  40442.00 TO NODE  40443.00 IS CODE = 51
-----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    760.00 DOWNSTREAM(FEET) =     653.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  188.00   CHANNEL SLOPE = 0.5691
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.377
 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      0.30     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) =      7.13
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.41
 AVERAGE FLOW DEPTH(FEET) =   0.48    TRAVEL TIME(MIN.) =   0.30
 Tc(MIN.) =    9.39
 SUBAREA AREA(ACRES) =      1.80      SUBAREA RUNOFF(CFS) =    5.00
 EFFECTIVE AREA(ACRES) =     3.44     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       3.4        PEAK FLOW RATE(CFS) =       9.53

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.53    FLOW VELOCITY(FEET/SEC.) =  11.26
 LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40443.00 =    760.00 FEET.

***********************************************************************
 FLOW PROCESS FROM NODE  40443.00 TO NODE  40444.00 IS CODE = 51
-----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    653.00 DOWNSTREAM(FEET) =     605.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  198.00   CHANNEL SLOPE = 0.2424
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  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            -        3.16      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) =     13.80
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.87
 AVERAGE FLOW DEPTH(FEET) =   0.72    TRAVEL TIME(MIN.) =   0.37
 Tc(MIN.) =    9.76
 SUBAREA AREA(ACRES) =      3.16      SUBAREA RUNOFF(CFS) =    8.53
 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) =      17.84

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.79    FLOW VELOCITY(FEET/SEC.) =  9.51
 LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40444.00 =    958.00 FEET.

***********************************************************************
 FLOW PROCESS FROM NODE  40444.00 TO NODE  40445.00 IS CODE = 51
-----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=======================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    605.00 DOWNSTREAM(FEET) =     579.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  243.00   CHANNEL SLOPE = 0.1070
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR = 3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  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
 USER-DEFINED            -        1.67      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) =     20.03
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.18
 AVERAGE FLOW DEPTH(FEET) =   0.96    TRAVEL TIME(MIN.) =   0.56
 Tc(MIN.) =   10.32
 SUBAREA AREA(ACRES) =      1.67      SUBAREA RUNOFF(CFS) =    4.37
 EFFECTIVE AREA(ACRES) =     8.27     AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       8.3        PEAK FLOW RATE(CFS) =      21.60

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.99    FLOW VELOCITY(FEET/SEC.) =  7.36
 LONGEST FLOWPATH FROM NODE  40440.00 TO NODE  40445.00 =   1201.00 FEET.

***********************************************************************
 FLOW PROCESS FROM NODE  40445.00 TO NODE  40445.00 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.) =   10.32
 RAINFALL INTENSITY(INCH/HR) =   3.20
 AREA-AVERAGED Fm(INCH/HR) =  0.30
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     AREA-AVERAGED Fp(INCH/HR) =  0.30
     AREA-AVERAGED Ap =  1.00
     EFFECTIVE STREAM AREA(ACRES) =        8.27
     TOTAL STREAM AREA(ACRES) =         8.27
     PEAK FLOW RATE(CFS) AT CONFLUENCE =        21.60

     ** CONFLUENCE DATA **
     STREAM     Q      Tc    Intensity  Fp(Fm)     Ap     Ae    HEADWATER
     NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)       (ACRES)   NODE
       1      22.15   9.79    3.297   0.30( 0.30) 1.00      8.2   40430.00
       2      21.60  10.32    3.200   0.30( 0.30) 1.00      8.3   40440.00

     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      43.32   9.79    3.297   0.30( 0.30) 1.00     16.1   40430.00
       2      43.03  10.32    3.200   0.30( 0.30) 1.00     16.5   40440.00

     COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
     PEAK FLOW RATE(CFS) =       43.32    Tc(MIN.) =     9.79
     EFFECTIVE AREA(ACRES) =       16.06   AREA-AVERAGED Fm(INCH/HR) = 0.30
     AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =        16.5
     LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40445.00 =    1251.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40445.00 TO NODE  40446.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    579.00  DOWNSTREAM(FEET) =    489.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   636.00   CHANNEL SLOPE =  0.1415
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.110
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp         Ap      SCS
      LAND USE             GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       3.79     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) =      48.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.95
  AVERAGE FLOW DEPTH(FEET) =  1.27   TRAVEL TIME(MIN.) =  1.07
  Tc(MIN.) =   10.86
  SUBAREA AREA(ACRES) =    3.79      SUBAREA RUNOFF(CFS) =    9.57
  EFFECTIVE AREA(ACRES) =    19.84     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =     20.3       PEAK FLOW RATE(CFS) =      50.19

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 1.29   FLOW VELOCITY(FEET/SEC.) = 10.11
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40446.00 =   1887.00 FEET.
```

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*******************************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE = 11
-------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
===============================================================================
  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     Q      Tc    Intensity  Fp(Fm)     Ap     Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)       (ACRES)   NODE
    1      50.19  10.86    3.110   0.30( 0.30) 1.00     19.8   40430.00
    2      49.75  11.39    3.027   0.30( 0.30) 1.00     20.3   40440.00
  LONGEST FLOWPATH FROM NODE  40430.00 TO NODE  40446.00 =    1887.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     Q      Tc    Intensity  Fp(Fm)     Ap     Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)       (ACRES)   NODE
    1      41.56  12.68    2.848   0.30( 0.30) 1.00     18.1   40420.00
  LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =    1989.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM     Q      Tc    Intensity  Fp(Fm)     Ap     Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)       (ACRES)   NODE
    1      89.42  10.86    3.110   0.30( 0.30) 1.00     35.4   40430.00
    2      89.69  11.39    3.027   0.30( 0.30) 1.00     36.5   40440.00
    3      88.05  12.68    2.848   0.30( 0.30) 1.00     38.4   40420.00
   TOTAL AREA(ACRES) =        38.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       89.69   Tc(MIN.) =   11.388
  EFFECTIVE AREA(ACRES) =       36.54   AREA-AVERAGED Fm(INCH/HR) = 0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        38.4
  LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40446.00 =    1989.00 FEET.

*******************************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40446.00 IS CODE = 12
-------------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
===============================================================================

*******************************************************************************
  FLOW PROCESS FROM NODE  40446.00 TO NODE  40447.00 IS CODE = 51
-------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    489.00  DOWNSTREAM(FEET) =    482.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   167.00   CHANNEL SLOPE =  0.0419
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.972
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL    AREA      Fp         Ap      SCS
      LAND USE             GROUP    (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       0.59     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) =      90.40
```

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    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.39
    AVERAGE FLOW DEPTH(FEET) =  2.02    TRAVEL TIME(MIN.) =   0.38
    Tc(MIN.) =   11.76
    SUBAREA AREA(ACRES) =      0.59       SUBAREA RUNOFF(CFS) =     1.42
    EFFECTIVE AREA(ACRES) =    37.13      AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
    TOTAL AREA(ACRES) =        39.0       PEAK FLOW RATE(CFS) =      89.69
    NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  2.01   FLOW VELOCITY(FEET/SEC.) =   7.39
    LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40447.00 =    2156.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE = 11
-------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
=========================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity  Fp(Fm)    Ap     Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
    1       89.42  11.23   3.051   0.30( 0.30) 1.00    35.9   40430.00
    2       89.69  11.76   2.972   0.30( 0.30) 1.00    37.1   40440.00
    3       88.05  13.06   2.801   0.30( 0.30) 1.00    39.0   40420.00
  LONGEST FLOWPATH FROM NODE  40420.00 TO NODE  40447.00 =    2156.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM      Q      Tc    Intensity  Fp(Fm)    Ap     Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
    1      180.74  12.92   2.818   0.30( 0.30) 1.00    79.7   40400.00
    2      180.61  13.15   2.791   0.30( 0.30) 1.00    80.6   40410.00
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM      Q      Tc    Intensity  Fp(Fm)    Ap     Ae    HEADWATER
  NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
    1      261.03  11.23   3.051   0.30( 0.30) 1.00   105.3   40430.00
    2      264.27  11.76   2.972   0.30( 0.30) 1.00   109.7   40440.00
    3      268.96  12.92   2.818   0.30( 0.30) 1.00   118.5   40400.00
    4      268.71  13.06   2.801   0.30( 0.30) 1.00   119.2   40420.00
    5      268.30  13.15   2.791   0.30( 0.30) 1.00   119.5   40410.00
     TOTAL AREA(ACRES) =       119.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      268.96  Tc(MIN.) =   12.924
  EFFECTIVE AREA(ACRES) =    118.53  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        119.5
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40447.00 =    2663.00 FEET.

*************************************************************************
  FLOW PROCESS FROM NODE  40447.00 TO NODE  40447.00 IS CODE = 12
-------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
=========================================================================

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

```
    FLOW PROCESS FROM NODE  40447.00 TO NODE  40448.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    482.00 DOWNSTREAM(FEET) =    447.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    926.00    CHANNEL SLOPE = 0.0378
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.636
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED              -        24.32     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) =     294.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.54
  AVERAGE FLOW DEPTH(FEET) =  3.21    TRAVEL TIME(MIN.) =   1.62
  Tc(MIN.) =   14.54
  SUBAREA AREA(ACRES) =     24.32       SUBAREA RUNOFF(CFS) =  51.13
  EFFECTIVE AREA(ACRES) =   142.85      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       143.9       PEAK FLOW RATE(CFS) =     300.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.23   FLOW VELOCITY(FEET/SEC.) =   9.60
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40448.00 =    3589.00 FEET.

***********************************************************************************
  FLOW PROCESS FROM NODE  40448.00 TO NODE  40449.00 IS CODE = 51
-------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    447.00 DOWNSTREAM(FEET) =    433.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    443.00    CHANNEL SLOPE = 0.0316
  CHANNEL BASE(FEET) =    0.00    "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.561
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA       Fp        Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR) (DECIMAL)   CN
  USER-DEFINED              -       108.49     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) =     410.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.70
  AVERAGE FLOW DEPTH(FEET) =  3.76    TRAVEL TIME(MIN.) =   0.76
  Tc(MIN.) =   15.30
  SUBAREA AREA(ACRES) =    108.49       SUBAREA RUNOFF(CFS) = 220.79
  EFFECTIVE AREA(ACRES) =   251.34      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       252.3       PEAK FLOW RATE(CFS) =     511.50

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  4.08   FLOW VELOCITY(FEET/SEC.) =  10.25
  LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40449.00 =    4032.00 FEET.
```

```
    ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR)  (INCH/HR)        (ACRES)    NODE
      1       521.89  13.62   2.736   0.30( 0.30) 1.00    238.1   40430.00
      2       519.04  14.14   2.678   0.30( 0.30) 1.00    242.5   40440.00
      3       511.50  15.30   2.561   0.30( 0.30) 1.00    251.3   40400.00
      4       509.96  15.44   2.548   0.30( 0.30) 1.00    252.0   40420.00
      5       508.84  15.52   2.540   0.30( 0.30) 1.00    252.3   40410.00
   NEW PEAK FLOW DATA ARE:
   PEAK FLOW RATE(CFS) =      521.89  Tc(MIN.) =    13.62
   AREA-AVERAGED Fm(INCH/HR) =  0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =      238.07

*********************************************************************************
   FLOW PROCESS FROM NODE  40449.00 TO NODE  40450.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     433.00  DOWNSTREAM(FEET) =     398.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1065.00   CHANNEL SLOPE = 0.0329
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.563
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         36.85      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) =      559.41
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.64
   AVERAGE FLOW DEPTH(FEET) =  4.19    TRAVEL TIME(MIN.) =   1.67
   Tc(MIN.) =   15.29
   SUBAREA AREA(ACRES) =     36.85        SUBAREA RUNOFF(CFS) =    75.03
   EFFECTIVE AREA(ACRES) =    274.92      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       289.2        PEAK FLOW RATE(CFS) =     559.83

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  4.19   FLOW VELOCITY(FEET/SEC.) = 10.65
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40450.00 =    5097.00 FEET.

    ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR)  (INCH/HR)        (ACRES)    NODE
      1       559.83  15.29   2.563   0.30( 0.30) 1.00    274.9   40430.00
      2       556.66  15.81   2.514   0.30( 0.30) 1.00    279.4   40440.00
      3       548.54  16.98   2.415   0.30( 0.30) 1.00    288.2   40400.00
      4       546.91  17.12   2.403   0.30( 0.30) 1.00    288.9   40420.00
      5       545.80  17.20   2.397   0.30( 0.30) 1.00    289.2   40410.00
   NEW PEAK FLOW DATA ARE:
   PEAK FLOW RATE(CFS) =      559.83  Tc(MIN.) =    15.29
   AREA-AVERAGED Fm(INCH/HR) =  0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =      274.92

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   FLOW PROCESS FROM NODE  40450.00 TO NODE  40451.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     398.00  DOWNSTREAM(FEET) =     386.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  401.00   CHANNEL SLOPE = 0.0299
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.505
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         71.80      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) =      631.07
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.58
   AVERAGE FLOW DEPTH(FEET) =  4.46    TRAVEL TIME(MIN.) =   0.63
   Tc(MIN.) =   15.92
   SUBAREA AREA(ACRES) =     71.80        SUBAREA RUNOFF(CFS) =   142.46
   EFFECTIVE AREA(ACRES) =    346.72      AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       361.0        PEAK FLOW RATE(CFS) =     687.93

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  4.60   FLOW VELOCITY(FEET/SEC.) = 10.82
   LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40451.00 =    5498.00 FEET.

    ** PEAK FLOW RATE TABLE **
   STREAM      Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR)  (INCH/HR)        (ACRES)    NODE
      1       687.93  15.92   2.505   0.30( 0.30) 1.00    346.7   40430.00
      2       682.28  16.45   2.459   0.30( 0.30) 1.00    351.2   40440.00
      3       669.11  17.61   2.365   0.30( 0.30) 1.00    360.0   40400.00
      4       666.89  17.76   2.354   0.30( 0.30) 1.00    360.7   40420.00
      5       665.47  17.84   2.348   0.30( 0.30) 1.00    361.0   40410.00
   NEW PEAK FLOW DATA ARE:
   PEAK FLOW RATE(CFS) =      687.93  Tc(MIN.) =    15.92
   AREA-AVERAGED Fm(INCH/HR) =  0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =      346.72

*********************************************************************************
   FLOW PROCESS FROM NODE  40451.00 TO NODE  40452.00 IS CODE =  51
-------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =     386.00  DOWNSTREAM(FEET) =     358.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  957.00   CHANNEL SLOPE = 0.0293
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.404
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL     AREA       Fp        Ap      SCS
        LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         12.07      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) =     699.36
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 13.37
      AVERAGE FLOW DEPTH(FEET) =  4.18    TRAVEL TIME(MIN.) =   1.19
      Tc(MIN.) =  17.11
      SUBAREA AREA(ACRES) =    12.07      SUBAREA RUNOFF(CFS) =   22.86
      EFFECTIVE AREA(ACRES) =    358.79     AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
      TOTAL AREA(ACRES) =      373.1       PEAK FLOW RATE(CFS) =    687.93
      NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) =  4.15    FLOW VELOCITY(FEET/SEC.) = 13.29
      LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40452.00 =   6455.00 FEET.

      ** PEAK FLOW RATE TABLE **
      STREAM      Q      Tc    Intensity  Fp(Fm)     Ap      Ae     HEADWATER
      NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)         (ACRES)    NODE
        1      687.93  17.11    2.404   0.30( 0.30) 1.00    358.8   40430.00
        2      682.28  17.64    2.363   0.30( 0.30) 1.00    363.2   40440.00
        3      669.11  18.81    2.278   0.30( 0.30) 1.00    372.1   40400.00
        4      666.89  18.96    2.269   0.30( 0.30) 1.00    372.8   40420.00
        5      665.47  19.04    2.263   0.30( 0.30) 1.00    373.1   40410.00
      NEW PEAK FLOW DATA ARE:
      PEAK FLOW RATE(CFS) =      687.93  Tc(MIN.) =   17.11
      AREA-AVERAGED Fm(INCH/HR) =   0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
      AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =      358.79

****************************************************************************
      FLOW PROCESS FROM NODE  40452.00 TO NODE  40453.00 IS CODE =  51
--------------------------------------------------------------------------
      >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
      >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
      ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =    341.00
      CHANNEL LENGTH THRU SUBAREA(FEET) =   429.00   CHANNEL SLOPE = 0.0396
      CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
      MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
      *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.367
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
           LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
      USER-DEFINED              -         0.27     0.30     0.500     -
      USER-DEFINED              -         1.96     0.30     1.000     -
      USER-DEFINED              -         0.96     0.30     1.000     -
      USER-DEFINED              -         0.38     0.30     1.000     -
      USER-DEFINED              -         0.18     0.30     1.000     -
      USER-DEFINED              -         1.69     0.30     1.000     -
      SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
      SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.975
      TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     693.01
      TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 14.94
      AVERAGE FLOW DEPTH(FEET) =  3.93    TRAVEL TIME(MIN.) =   0.48
      Tc(MIN.) =  17.59
      SUBAREA AREA(ACRES) =     5.44      SUBAREA RUNOFF(CFS) =   10.16
      EFFECTIVE AREA(ACRES) =    364.23     AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
      TOTAL AREA(ACRES) =      378.5       PEAK FLOW RATE(CFS) =    687.93
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      NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

      END OF SUBAREA CHANNEL FLOW HYDRAULICS:
      DEPTH(FEET) =  3.92    FLOW VELOCITY(FEET/SEC.) = 14.93
      LONGEST FLOWPATH FROM NODE  40400.00 TO NODE  40453.00 =   6884.00 FEET.

      ** PEAK FLOW RATE TABLE **
      STREAM      Q      Tc    Intensity  Fp(Fm)     Ap      Ae     HEADWATER
      NUMBER    (CFS)  (MIN.) (INCH/HR)  (INCH/HR)         (ACRES)    NODE
        1      687.93  17.59    2.367   0.30( 0.30) 1.00    364.2   40430.00
        2      682.28  18.12    2.327   0.30( 0.30) 1.00    368.7   40440.00
        3      669.11  19.30    2.246   0.30( 0.30) 1.00    377.5   40400.00
        4      666.89  19.44    2.237   0.30( 0.30) 1.00    378.2   40420.00
        5      665.47  19.52    2.231   0.30( 0.30) 1.00    378.5   40410.00
      NEW PEAK FLOW DATA ARE:
      PEAK FLOW RATE(CFS) =      687.93  Tc(MIN.) =   17.59
      AREA-AVERAGED Fm(INCH/HR) =   0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
      AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =      364.23

****************************************************************************
      FLOW PROCESS FROM NODE  40453.00 TO NODE  40453.00 IS CODE =  81
--------------------------------------------------------------------------
      >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
      MAINLINE Tc(MIN.) =   17.59
      *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.367
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
           LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
      USER-DEFINED              -         0.18     0.30     1.000     -
      USER-DEFINED              -         5.30     0.30     0.850     -
      USER-DEFINED              -         0.64     0.30     1.000     -
      USER-DEFINED              -         2.08     0.30     1.000     -
      USER-DEFINED              -         0.67     0.30     0.100     -
      USER-DEFINED              -         0.29     0.30     1.000     -
      SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
      SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.847
      SUBAREA AREA(ACRES) =     9.16      SUBAREA RUNOFF(CFS) =   17.42
      EFFECTIVE AREA(ACRES) =    373.39     AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
      TOTAL AREA(ACRES) =      387.7       PEAK FLOW RATE(CFS) =    695.01

****************************************************************************
      FLOW PROCESS FROM NODE  40453.00 TO NODE  40450.00 IS CODE =  81
--------------------------------------------------------------------------
      >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
      MAINLINE Tc(MIN.) =   17.59
      *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.367
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
           LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
      USER-DEFINED              -         0.03     0.30     1.000     -
      USER-DEFINED              -         4.59     0.30     0.850     -
      USER-DEFINED              -         0.01     0.30     1.000     -
      USER-DEFINED              -         0.51     0.30     1.000     -
      USER-DEFINED              -         0.73     0.30     1.000     -
      USER-DEFINED              -         0.16     0.30     1.000     -
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SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.886
SUBAREA AREA(ACRES) =     6.03      SUBAREA RUNOFF(CFS) =    11.40
EFFECTIVE AREA(ACRES) =     379.42   AREA-AVERAGED Fm(INCH/HR) =  0.30
AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.99
TOTAL AREA(ACRES) =      393.7       PEAK FLOW RATE(CFS) =      706.41

******************************************************************************
  FLOW PROCESS FROM NODE  40453.00 TO NODE  40453.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   17.59
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.367
  SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/        SCS SOIL   AREA      Fp         Ap      SCS
        LAND USE          GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        0.37      0.30       1.000     -
  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) =    0.87      SUBAREA RUNOFF(CFS) =     1.62
  EFFECTIVE AREA(ACRES) =    380.29   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      394.6       PEAK FLOW RATE(CFS) =      708.03
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)    =      394.6  TC(MIN.) =     17.59
  EFFECTIVE AREA(ACRES) =    380.29 AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.994
  PEAK FLOW RATE(CFS)   =      708.03

  ** PEAK FLOW RATE TABLE **
  STREAM     Q       Tc   Intensity  Fp(Fm)    Ap      Ae     HEADWATER
  NUMBER   (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)   NODE
    1     708.03   17.59    2.367   0.30( 0.30) 0.99   380.3   40430.00
    2     702.63   18.12    2.327   0.30( 0.30) 0.99   384.7   40440.00
    3     689.90   19.30    2.246   0.30( 0.30) 0.99   393.6   40400.00
    4     687.80   19.44    2.237   0.30( 0.30) 0.99   394.3   40420.00
    5     686.41   19.52    2.231   0.30( 0.30) 0.99   394.6   40410.00
==============================================================================

==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
_____
***********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:




 ************************* DESCRIPTION OF STUDY *************************
* RMV PA-4 WATERSHED 5 EXISTING CONDITION                             *
* RATIONAL METHOD HYDROLOGY MODEL LOCAL                               *
* 100-YR EV  AUGUST 2017 ROKAMOTO                                     *
 *********************************************************************

  FILE NAME: 0610405Y.DAT
  TIME/DATE OF STUDY: 09:00 08/02/2017
================================================================================
  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  60.0    30.0      0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  2  50.0    25.0      0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  3  40.0    20.0      0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  4  30.0    15.0      0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150
  5  20.0    10.0      0.020/0.020/0.020   0.67   2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40500.00 TO NODE  40501.00 IS CODE = 21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   328.00
  ELEVATION DATA: UPSTREAM(FEET) =   961.00  DOWNSTREAM(FEET) =   845.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.819
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.499
  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
  "CHAPARRAL,BROADLEAF"      -      0.63    0.30     1.000     0    8.82
  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) =      0.63    PEAK FLOW RATE(CFS) =     1.81

****************************************************************************
  FLOW PROCESS FROM NODE  40501.00 TO NODE  40502.00 IS CODE = 51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   845.00  DOWNSTREAM(FEET) =    788.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  141.00   CHANNEL SLOPE = 0.4043
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.431
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA     Fp       Ap      SCS
        LAND USE          GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED              -      1.11    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) =     3.38
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.63
  AVERAGE FLOW DEPTH(FEET) =   0.38    TRAVEL TIME(MIN.) =   0.31
  Tc(MIN.) =   9.13
  SUBAREA AREA(ACRES) =     1.11      SUBAREA RUNOFF(CFS) =    3.13
  EFFECTIVE AREA(ACRES) =     1.74      AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       1.7         PEAK FLOW RATE(CFS) =      4.91

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45    FLOW VELOCITY(FEET/SEC.) =   8.25
  LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40502.00 =    469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40502.00 TO NODE  40503.00 IS CODE = 51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   788.00  DOWNSTREAM(FEET) =    719.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  187.00   CHANNEL SLOPE = 0.3690
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.357
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        1.44     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) =      6.89
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 8.69
   AVERAGE FLOW DEPTH(FEET) =  0.51   TRAVEL TIME(MIN.) =   0.36
   Tc(MIN.) =   9.49
   SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    3.96
   EFFECTIVE AREA(ACRES) =     3.18    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) =       8.75

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.56   FLOW VELOCITY(FEET/SEC.) = 9.31
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40503.00 =    656.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40503.00 TO NODE  40504.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    719.00  DOWNSTREAM(FEET) =    545.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   302.00   CHANNEL SLOPE = 0.5762
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.278
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        3.36     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) =     13.25
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 12.27
   AVERAGE FLOW DEPTH(FEET) =  0.60   TRAVEL TIME(MIN.) =   0.41
   Tc(MIN.) =   9.90
   SUBAREA AREA(ACRES) =    3.36      SUBAREA RUNOFF(CFS) =    9.00
   EFFECTIVE AREA(ACRES) =     6.54    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) =      17.53

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.67   FLOW VELOCITY(FEET/SEC.) = 13.07
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40504.00 =    958.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40504.00 TO NODE  40505.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    545.00  DOWNSTREAM(FEET) =    470.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   328.00   CHANNEL SLOPE = 0.2287
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
```

```
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.185
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -        9.58     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) =     29.97
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.58
   AVERAGE FLOW DEPTH(FEET) =  0.97   TRAVEL TIME(MIN.) =   0.52
   Tc(MIN.) =   10.41
   SUBAREA AREA(ACRES) =    9.58      SUBAREA RUNOFF(CFS) =   24.87
   EFFECTIVE AREA(ACRES) =    16.12    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      16.1     PEAK FLOW RATE(CFS) =      41.85

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.10   FLOW VELOCITY(FEET/SEC.) = 11.50
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40505.00 =   1286.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40505.00 TO NODE  40506.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    410.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   507.00   CHANNEL SLOPE = 0.1183
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.042
   SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap      SCS
      LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -       10.98     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) =     55.41
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 9.64
   AVERAGE FLOW DEPTH(FEET) =  1.38   TRAVEL TIME(MIN.) =   0.88
   Tc(MIN.) =   11.29
   SUBAREA AREA(ACRES) =   10.98      SUBAREA RUNOFF(CFS) =   27.11
   EFFECTIVE AREA(ACRES) =    27.10    AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      27.1     PEAK FLOW RATE(CFS) =      66.89

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.48   FLOW VELOCITY(FEET/SEC.) = 10.11
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40506.00 =   1793.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40506.00 TO NODE  40507.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    410.00  DOWNSTREAM(FEET) =    355.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   698.00   CHANNEL SLOPE = 0.0788
```

```
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.858
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        4.53      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) =      72.11
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.82
 AVERAGE FLOW DEPTH(FEET) = 1.65   TRAVEL TIME(MIN.) =  1.32
 Tc(MIN.) =   12.61
 SUBAREA AREA(ACRES) =     4.53      SUBAREA RUNOFF(CFS) =   10.43
 EFFECTIVE AREA(ACRES) =     31.63      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      31.6         PEAK FLOW RATE(CFS) =      72.82

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 1.65   FLOW VELOCITY(FEET/SEC.) =  8.89
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40507.00 =   2491.00 FEET.

*******************************************************************************
 FLOW PROCESS FROM NODE  40507.00 TO NODE  40518.00 IS CODE = 51
-------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    341.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   604.00   CHANNEL SLOPE = 0.0232
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.692
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        9.02      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) =      82.54
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.18
 AVERAGE FLOW DEPTH(FEET) = 1.96   TRAVEL TIME(MIN.) =  1.40
 Tc(MIN.) =   14.01
 SUBAREA AREA(ACRES) =     9.02      SUBAREA RUNOFF(CFS) =   19.43
 EFFECTIVE AREA(ACRES) =     40.66      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =      40.7         PEAK FLOW RATE(CFS) =      87.54

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 2.00   FLOW VELOCITY(FEET/SEC.) =  7.28
 LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40518.00 =   3095.00 FEET.

*******************************************************************************
 FLOW PROCESS FROM NODE  40518.00 TO NODE  40518.00 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.) =   14.01
 RAINFALL INTENSITY(INCH/HR) =   2.69
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      40.66
 TOTAL STREAM AREA(ACRES) =      40.66
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       87.54

*******************************************************************************
 FLOW PROCESS FROM NODE  40510.00 TO NODE  40511.00 IS CODE = 21
-------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
===============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   329.00
 ELEVATION DATA: UPSTREAM(FEET) =    851.00  DOWNSTREAM(FEET) =    735.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.835
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.495
 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
 "CHAPARRAL,BROADLEAF"       -        0.48      0.30      1.000     0    8.84
 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) =       0.48    PEAK FLOW RATE(CFS) =       1.37

*******************************************************************************
 FLOW PROCESS FROM NODE  40511.00 TO NODE  40512.00 IS CODE = 51
-------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    735.00  DOWNSTREAM(FEET) =    650.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   116.00   CHANNEL SLOPE = 0.7328
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.446
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED                -        0.73      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) =       2.40
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.75
 AVERAGE FLOW DEPTH(FEET) =  0.30   TRAVEL TIME(MIN.) =   0.22
 Tc(MIN.) =    9.06
 SUBAREA AREA(ACRES) =     0.73      SUBAREA RUNOFF(CFS) =    2.05
 EFFECTIVE AREA(ACRES) =      1.20      AREA-AVERAGED Fm(INCH/HR) =   0.30
 AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       1.2         PEAK FLOW RATE(CFS) =       3.40
```

```
   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.35   FLOW VELOCITY(FEET/SEC.) = 9.47
   LONGEST FLOWPATH FROM NODE 40510.00 TO NODE 40512.00 =    445.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  40512.00 TO NODE  40513.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    581.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  152.00   CHANNEL SLOPE = 0.4539
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.386
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap     SCS
        LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -         1.36     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) =     5.29
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.89
   AVERAGE FLOW DEPTH(FEET) =  0.45    TRAVEL TIME(MIN.) =  0.28
   Tc(MIN.) =   9.34
   SUBAREA AREA(ACRES) =    1.36      SUBAREA RUNOFF(CFS) =   3.77
   EFFECTIVE AREA(ACRES) =     2.56     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) =      7.11

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.50   FLOW VELOCITY(FEET/SEC.) = 9.53
   LONGEST FLOWPATH FROM NODE 40510.00 TO NODE 40513.00 =    597.00 FEET.


***************************************************************************
   FLOW PROCESS FROM NODE  40513.00 TO NODE  40514.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    581.00  DOWNSTREAM(FEET) =    500.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  175.00   CHANNEL SLOPE = 0.4629
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.331
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap     SCS
        LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -         2.32     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.) = 10.56
   AVERAGE FLOW DEPTH(FEET) =  0.57    TRAVEL TIME(MIN.) =  0.28
   Tc(MIN.) =   9.62
   SUBAREA AREA(ACRES) =    2.32      SUBAREA RUNOFF(CFS) =   6.32
   EFFECTIVE AREA(ACRES) =     4.88     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
```

```
   TOTAL AREA(ACRES) =       4.9       PEAK FLOW RATE(CFS) =      13.30

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.63   FLOW VELOCITY(FEET/SEC.) = 11.23
   LONGEST FLOWPATH FROM NODE 40510.00 TO NODE 40514.00 =    772.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40514.00 TO NODE  40515.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    500.00  DOWNSTREAM(FEET) =    440.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  206.00   CHANNEL SLOPE = 0.2913
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.265
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap     SCS
        LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -         2.15     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) =     16.17
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.92
   AVERAGE FLOW DEPTH(FEET) =  0.74    TRAVEL TIME(MIN.) =  0.35
   Tc(MIN.) =   9.96
   SUBAREA AREA(ACRES) =    2.15      SUBAREA RUNOFF(CFS) =   5.74
   EFFECTIVE AREA(ACRES) =     7.03     AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       7.0       PEAK FLOW RATE(CFS) =      18.76

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 0.78   FLOW VELOCITY(FEET/SEC.) = 10.25
   LONGEST FLOWPATH FROM NODE 40510.00 TO NODE 40515.00 =    978.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40515.00 TO NODE  40516.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    440.00  DOWNSTREAM(FEET) =    390.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  269.00   CHANNEL SLOPE = 0.1859
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.180
   SUBAREA LOSS RATE DATA(AMC II):
    DEVELOPMENT TYPE/     SCS SOIL    AREA      Fp       Ap     SCS
        LAND USE          GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED             -         5.24     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) =     25.55
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.42
   AVERAGE FLOW DEPTH(FEET) =  0.95    TRAVEL TIME(MIN.) =  0.48
   Tc(MIN.) =   10.44
   SUBAREA AREA(ACRES) =    5.24      SUBAREA RUNOFF(CFS) =   13.59
```

```
    EFFECTIVE AREA(ACRES) =     12.27    AREA-AVERAGED Fm(INCH/HR) =   0.30
    AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
    TOTAL AREA(ACRES) =         12.3       PEAK FLOW RATE(CFS) =       31.81

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) = 1.03   FLOW VELOCITY(FEET/SEC.) =   9.94
    LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40516.00 =   1247.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40516.00 TO NODE  40517.00 IS CODE =  51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    390.00  DOWNSTREAM(FEET) =    355.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    384.00   CHANNEL SLOPE =  0.0911
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.048
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap      SCS
         LAND USE          GROUP    (ACRES) (INCH/HR) (DECIMAL)  CN
   USER-DEFINED              -         4.01     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) =      36.77
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  7.89
   AVERAGE FLOW DEPTH(FEET) =  1.25   TRAVEL TIME(MIN.) =   0.81
   Tc(MIN.) =  11.25
   SUBAREA AREA(ACRES) =    4.01       SUBAREA RUNOFF(CFS) =    9.92
   EFFECTIVE AREA(ACRES) =     16.28    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         16.3       PEAK FLOW RATE(CFS) =       40.27

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.29   FLOW VELOCITY(FEET/SEC.) =   8.11
   LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40517.00 =   1631.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40517.00 TO NODE  40518.00 IS CODE =  51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    341.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    512.00   CHANNEL SLOPE =  0.0273
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) = 20.00
   *  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              -         8.89     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) =      50.55
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  6.73
   AVERAGE FLOW DEPTH(FEET) =  1.58   TRAVEL TIME(MIN.) =   1.27
```

```
   Tc(MIN.) =  12.52
   SUBAREA AREA(ACRES) =    8.89       SUBAREA RUNOFF(CFS) =   20.56
   EFFECTIVE AREA(ACRES) =     25.17    AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =         25.2       PEAK FLOW RATE(CFS) =       58.21

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.67   FLOW VELOCITY(FEET/SEC.) =   6.99
   LONGEST FLOWPATH FROM NODE  40510.00 TO NODE  40518.00 =   2143.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40518.00 TO NODE  40518.00 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.) =   12.52
   RAINFALL INTENSITY(INCH/HR) =   2.87
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =      25.17
   TOTAL STREAM AREA(ACRES) =       25.17
   PEAK FLOW RATE(CFS) AT CONFLUENCE =       58.21

   ** CONFLUENCE DATA **
   STREAM     Q      Tc    Intensity  Fp(Fm)    Ap    Ae    HEADWATER
   NUMBER   (CFS)  (MIN.) (INCH/HR) (INCH/HR)       (ACRES)   NODE
     1      87.54  14.01   2.692   0.30( 0.30) 1.00    40.7   40500.00
     2      58.21  12.52   2.869   0.30( 0.30) 1.00    25.2   40510.00

   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     142.22  12.52   2.869   0.30( 0.30) 1.00    61.5   40510.00
     2     141.74  14.01   2.692   0.30( 0.30) 1.00    65.8   40500.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =    142.22    Tc(MIN.) =   12.52
   EFFECTIVE AREA(ACRES) =       61.50   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =        65.8
   LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40518.00 =   3095.00 FEET.

*****************************************************************************
  FLOW PROCESS FROM NODE  40518.00 TO NODE  40519.00 IS CODE =  51
---------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
===========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    341.00  DOWNSTREAM(FEET) =    333.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =    688.00   CHANNEL SLOPE =  0.0116
   CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =   3.000
```

```
     MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
     * 25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.661
     SUBAREA LOSS RATE DATA(AMC  II):
      DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
         LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
     USER-DEFINED               -         3.34       0.30     1.000     -
     USER-DEFINED               -         2.15       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) =    148.05
     TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.41
     AVERAGE FLOW DEPTH(FEET) =  2.77   TRAVEL TIME(MIN.) =   1.79
     Tc(MIN.) =   14.31
     SUBAREA AREA(ACRES) =      5.49       SUBAREA RUNOFF(CFS) =   11.66
     EFFECTIVE AREA(ACRES) =     66.99      AREA-AVERAGED Fm(INCH/HR) =   0.30
     AREA-AVERAGED Fp(INCH/HR) =   0.30   AREA-AVERAGED Ap =  1.00
     TOTAL AREA(ACRES) =       71.3          PEAK FLOW RATE(CFS) =    142.32

     END OF SUBAREA CHANNEL FLOW HYDRAULICS:
     DEPTH(FEET) =  2.73   FLOW VELOCITY(FEET/SEC.) =   6.35
     LONGEST FLOWPATH FROM NODE  40500.00 TO NODE  40519.00 =    3783.00 FEET.

     ** PEAK FLOW RATE TABLE **
      STREAM      Q      Tc   Intensity  Fp(Fm)      Ap      Ae    HEADWATER
      NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
        1      142.32   14.31    2.661  0.30( 0.30) 1.00     67.0   40510.00
        2      142.20   15.80    2.515  0.30( 0.30) 1.00     71.3   40500.00
     NEW PEAK FLOW DATA ARE:
     PEAK FLOW RATE(CFS) =     142.32  Tc(MIN.) =   14.31
     AREA-AVERAGED Fm(INCH/HR) =  0.30  AREA-AVERAGED Fp(INCH/HR) =  0.30
     AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =       66.99


     ****************************************************************************
      FLOW PROCESS FROM NODE  40519.00 TO NODE  40519.00 IS CODE =  81
     ----------------------------------------------------------------------
      >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
     ==========================================================================
      MAINLINE Tc(MIN.) =   14.31
      * 25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.661
      SUBAREA LOSS RATE DATA(AMC  II):
       DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
          LAND USE             GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
      USER-DEFINED               -         0.35       0.30     0.500     -
      USER-DEFINED               -         4.48       0.30     1.000     -
      USER-DEFINED               -         0.38       0.30     1.000     -
      USER-DEFINED               -         1.49       0.30     1.000     -
      SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
      SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.974
      SUBAREA AREA(ACRES) =    6.70      SUBAREA RUNOFF(CFS) =   14.28
      EFFECTIVE AREA(ACRES) =     73.69   AREA-AVERAGED Fm(INCH/HR) =   0.30
      AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
      TOTAL AREA(ACRES) =       78.0        PEAK FLOW RATE(CFS) =    156.61
     ==========================================================================
      END OF STUDY SUMMARY:
      TOTAL AREA(ACRES)      =       78.0  TC(MIN.) =     14.31
      EFFECTIVE AREA(ACRES) =     73.69  AREA-AVERAGED Fm(INCH/HR)=  0.30
      AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.998
      PEAK FLOW RATE(CFS)   =      156.61
```

```
      ** PEAK FLOW RATE TABLE **
       STREAM      Q      Tc   Intensity  Fp(Fm)      Ap      Ae    HEADWATER
       NUMBER    (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
         1      156.61   14.31    2.661  0.30( 0.30) 1.00     73.7   40510.00
         2      155.60   15.80    2.515  0.30( 0.30) 1.00     78.0   40500.00
     ==========================================================================
     ==========================================================================
      END OF RATIONAL METHOD ANALYSIS
```

```
_____
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
             (c) Copyright 1983-2013 Advanced Engineering Software (aes)
               Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                       Analysis prepared by:




 *************************** DESCRIPTION OF STUDY ***************************
 * RMV PA-4 WATERSHED 6 EXISTING CONDITION                                 *
 * RATIONAL METHOD HYDROLOGY MODEL LOCAL                                   *
 * 100-YR EV  AUGUST 2017 ROKAMOTO                                         *
 **************************************************************************

  FILE NAME: X40600EV.DAT
  TIME/DATE OF STUDY: 12:59 08/02/2017
========================================================================
  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  60.0    30.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  2  50.0    25.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  3  40.0    20.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  4  30.0    15.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150
  5  20.0    10.0    0.020/0.020/0.020  0.67   2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 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  40600.00 TO NODE  40601.00 IS CODE =  21
---------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   279.00
  ELEVATION DATA: UPSTREAM(FEET) =   1054.00  DOWNSTREAM(FEET) =   1000.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.326
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.390
  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"             -        0.54     0.30     1.000    0   9.33
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
  SUBAREA RUNOFF(CFS) =      1.51
  TOTAL AREA(ACRES) =        0.54   PEAK FLOW RATE(CFS) =       1.51

****************************************************************************
  FLOW PROCESS FROM NODE  40601.00 TO NODE  40602.00 IS CODE =  51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    985.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   199.00   CHANNEL SLOPE = 0.0754
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.222
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp       Ap    SCS
        LAND USE           GROUP   (ACRES) (INCH/HR) (DECIMAL) CN
  USER-DEFINED             -        0.76     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) =     2.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.78
  AVERAGE FLOW DEPTH(FEET) =   0.47    TRAVEL TIME(MIN.) =   0.88
  Tc(MIN.) =   10.20
  SUBAREA AREA(ACRES) =      0.76      SUBAREA RUNOFF(CFS) =    2.00
  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) =      3.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.53   FLOW VELOCITY(FEET/SEC.) =   4.07
  LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40602.00 =    478.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40602.00 TO NODE  40603.00 IS CODE =  51
---------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    985.00  DOWNSTREAM(FEET) =    958.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   282.00   CHANNEL SLOPE = 0.0957
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
  * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 3.060
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -         1.11      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) =      4.80
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.84
 AVERAGE FLOW DEPTH(FEET) =  0.58   TRAVEL TIME(MIN.) =  0.97
 Tc(MIN.) =  11.17
 SUBAREA AREA(ACRES) =    1.11      SUBAREA RUNOFF(CFS) =   2.76
 EFFECTIVE AREA(ACRES) =     2.41    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       2.4       PEAK FLOW RATE(CFS) =     5.99

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.62   FLOW VELOCITY(FEET/SEC.) =  5.15
 LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40603.00 =   760.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40603.00 TO NODE  40604.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    958.00  DOWNSTREAM(FEET) =    940.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  219.00   CHANNEL SLOPE = 0.0822
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 * 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
 USER-DEFINED             -         0.36      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) =      6.42
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  4.90
 AVERAGE FLOW DEPTH(FEET) =  0.66   TRAVEL TIME(MIN.) =  0.74
 Tc(MIN.) =  11.92
 SUBAREA AREA(ACRES) =    0.36      SUBAREA RUNOFF(CFS) =   0.85
 EFFECTIVE AREA(ACRES) =     2.77    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       2.8       PEAK FLOW RATE(CFS) =     6.61

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.67   FLOW VELOCITY(FEET/SEC.) =  4.96
 LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40604.00 =   979.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40604.00 TO NODE  40605.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    940.00  DOWNSTREAM(FEET) =    800.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  547.00   CHANNEL SLOPE = 0.2559
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
```

```
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.808
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -         3.00      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) =      9.99
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  8.38
 AVERAGE FLOW DEPTH(FEET) =  0.63   TRAVEL TIME(MIN.) =  1.09
 Tc(MIN.) =  13.01
 SUBAREA AREA(ACRES) =    3.00      SUBAREA RUNOFF(CFS) =   6.77
 EFFECTIVE AREA(ACRES) =     5.77    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) =    13.02

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.70   FLOW VELOCITY(FEET/SEC.) =  8.93
 LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40605.00 =   1526.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40605.00 TO NODE  40606.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    680.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  277.00   CHANNEL SLOPE = 0.4332
 CHANNEL BASE(FEET) =   0.00   "Z" FACTOR =  3.000
 MANNING'S FACTOR = 0.040  MAXIMUM DEPTH(FEET) = 20.00
 * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.759
 SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp        Ap      SCS
     LAND USE           GROUP     (ACRES)   (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED             -         2.22      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) =     15.48
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.35
 AVERAGE FLOW DEPTH(FEET) =  0.67   TRAVEL TIME(MIN.) =  0.41
 Tc(MIN.) =  13.41
 SUBAREA AREA(ACRES) =    2.22      SUBAREA RUNOFF(CFS) =   4.92
 EFFECTIVE AREA(ACRES) =     7.99    AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30 AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       8.0       PEAK FLOW RATE(CFS) =    17.69

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) = 0.71   FLOW VELOCITY(FEET/SEC.) = 11.81
 LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40606.00 =   1803.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE  40606.00 TO NODE  40607.00 IS CODE = 51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    680.00  DOWNSTREAM(FEET) =    670.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   59.00   CHANNEL SLOPE = 0.1695
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   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.747
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         9.34      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) =      27.97
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.28
   AVERAGE FLOW DEPTH(FEET) =  1.00   TRAVEL TIME(MIN.) =   0.11
   Tc(MIN.) =   13.52
   SUBAREA AREA(ACRES) =     9.34      SUBAREA RUNOFF(CFS) =   20.56
   EFFECTIVE AREA(ACRES) =    17.33     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =     17.3        PEAK FLOW RATE(CFS) =       38.16

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.12   FLOW VELOCITY(FEET/SEC.) = 10.06
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40607.00 =   1862.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40607.00 TO NODE  40608.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    670.00  DOWNSTREAM(FEET) =    585.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   246.00   CHANNEL SLOPE = 0.3455
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.713
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL    AREA       Fp         Ap      SCS
        LAND USE           GROUP     (ACRES)  (INCH/HR)  (DECIMAL)  CN
   USER-DEFINED              -         4.64      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) =      43.20
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 13.50
   AVERAGE FLOW DEPTH(FEET) =  1.03   TRAVEL TIME(MIN.) =   0.30
   Tc(MIN.) =   13.82
   SUBAREA AREA(ACRES) =     4.64      SUBAREA RUNOFF(CFS) =   10.07
   EFFECTIVE AREA(ACRES) =    21.96     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =     22.0        PEAK FLOW RATE(CFS) =       47.69

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.07   FLOW VELOCITY(FEET/SEC.) = 13.86
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40608.00 =   2108.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40608.00 TO NODE  40609.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
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```
   ELEVATION DATA: UPSTREAM(FEET) =    585.00  DOWNSTREAM(FEET) =    494.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   482.00   CHANNEL SLOPE = 0.1888
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 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              -         8.61      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) =      56.76
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 11.57
   AVERAGE FLOW DEPTH(FEET) =  1.28   TRAVEL TIME(MIN.) =   0.69
   Tc(MIN.) =   14.52
   SUBAREA AREA(ACRES) =     8.61      SUBAREA RUNOFF(CFS) =   18.13
   EFFECTIVE AREA(ACRES) =    30.57     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =     30.6        PEAK FLOW RATE(CFS) =       64.35

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.34   FLOW VELOCITY(FEET/SEC.) = 11.95
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40609.00 =   2590.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40609.00 TO NODE  40610.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
=========================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    494.00  DOWNSTREAM(FEET) =    470.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   236.00   CHANNEL SLOPE = 0.1017
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) = 20.00
   *  25 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              -        18.33      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) =      83.32
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.10
   AVERAGE FLOW DEPTH(FEET) =  1.66   TRAVEL TIME(MIN.) =   0.39
   Tc(MIN.) =   14.91
   SUBAREA AREA(ACRES) =    18.33      SUBAREA RUNOFF(CFS) =   37.93
   EFFECTIVE AREA(ACRES) =    48.90     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30 AREA-AVERAGED Ap =   1.00
   TOTAL AREA(ACRES) =     48.9        PEAK FLOW RATE(CFS) =      101.21

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  1.78   FLOW VELOCITY(FEET/SEC.) = 10.62
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40610.00 =   2826.00 FEET.

***************************************************************************
   FLOW PROCESS FROM NODE  40610.00 TO NODE  40611.00 IS CODE = 51
-------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
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   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    470.00  DOWNSTREAM(FEET) =    425.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   560.00   CHANNEL SLOPE = 0.0804
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.511
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        10.11     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) =   111.26
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.92
   AVERAGE FLOW DEPTH(FEET) =  1.93   TRAVEL TIME(MIN.) =  0.94
   Tc(MIN.) =  15.85
   SUBAREA AREA(ACRES) =    10.11      SUBAREA RUNOFF(CFS) =   20.11
   EFFECTIVE AREA(ACRES) =     59.01     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       59.0        PEAK FLOW RATE(CFS) =     117.43

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 1.97   FLOW VELOCITY(FEET/SEC.) = 10.07
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40611.00 =   3386.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40611.00 TO NODE  40612.00 IS CODE =  51
------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    425.00  DOWNSTREAM(FEET) =    373.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   906.00   CHANNEL SLOPE = 0.0574
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.375
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -        20.87     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) =   136.92
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  9.22
   AVERAGE FLOW DEPTH(FEET) =  2.22   TRAVEL TIME(MIN.) =  1.64
   Tc(MIN.) =  17.48
   SUBAREA AREA(ACRES) =    20.87      SUBAREA RUNOFF(CFS) =   38.98
   EFFECTIVE AREA(ACRES) =     79.89     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       79.9        PEAK FLOW RATE(CFS) =     149.19

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.30   FLOW VELOCITY(FEET/SEC.) =  9.41
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40612.00 =   4292.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40612.00 TO NODE  40613.00 IS CODE =  51
```

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------------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    373.00  DOWNSTREAM(FEET) =    328.00
   CHANNEL LENGTH THRU SUBAREA(FEET) = 1192.00   CHANNEL SLOPE = 0.0378
   CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  3.000
   MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  20.00
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.236
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -         0.04     0.30     1.000     -
   USER-DEFINED               -         0.14     0.30     1.000     -
   USER-DEFINED               -         0.96     0.30     1.000     -
   USER-DEFINED               -         0.21     0.30     1.000     -
   USER-DEFINED               -         0.71     0.30     1.000     -
   USER-DEFINED               -         3.41     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) =    153.95
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 10.09
   AVERAGE FLOW DEPTH(FEET) =  2.26   TRAVEL TIME(MIN.) =  1.97
   Tc(MIN.) =  19.45
   SUBAREA AREA(ACRES) =    5.47       SUBAREA RUNOFF(CFS) =    9.53
   EFFECTIVE AREA(ACRES) =     85.36     AREA-AVERAGED Fm(INCH/HR) =   0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       85.4        PEAK FLOW RATE(CFS) =     149.19
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) = 2.23   FLOW VELOCITY(FEET/SEC.) =  9.99
   LONGEST FLOWPATH FROM NODE  40600.00 TO NODE  40613.00 =   5484.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE  40613.00 TO NODE  40613.00 IS CODE =  81
------------------------------------------------------------------------------
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   MAINLINE Tc(MIN.) =  19.45
   * 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.236
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/       SCS SOIL    AREA       Fp        Ap      SCS
        LAND USE            GROUP     (ACRES)  (INCH/HR) (DECIMAL)  CN
   USER-DEFINED               -         0.07     0.30     1.000     -
   USER-DEFINED               -         0.69     0.30     1.000     -
   USER-DEFINED               -         0.99     0.30     1.000     -
   USER-DEFINED               -         4.13     0.30     1.000     -
   USER-DEFINED               -         0.72     0.30     1.000     -
   USER-DEFINED               -         0.26     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) =    6.86       SUBAREA RUNOFF(CFS) =   11.95
   EFFECTIVE AREA(ACRES) =     92.22   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =   0.30  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =       92.2        PEAK FLOW RATE(CFS) =     160.66

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 FLOW PROCESS FROM NODE  40613.00 TO NODE  40613.00 IS CODE =  81
-------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===============================================================================
 MAINLINE Tc(MIN.) =   19.45
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.236
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL    AREA      Fp        Ap       SCS
      LAND USE           GROUP     (ACRES)  (INCH/HR) (DECIMAL)   CN
 USER-DEFINED              -         6.92      0.30     1.000      -
 USER-DEFINED              -         2.35      0.30     1.000      -
 USER-DEFINED              -         0.47      0.30     1.000      -
 USER-DEFINED              -         3.66      0.30     1.000      -
 USER-DEFINED              -         0.31      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) =   13.71      SUBAREA RUNOFF(CFS) =   23.89
 EFFECTIVE AREA(ACRES) =    105.93  AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       105.9       PEAK FLOW RATE(CFS) =     184.54
===============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      105.9  TC(MIN.) =     19.45
 EFFECTIVE AREA(ACRES) =    105.93  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)   =      184.54
===============================================================================
===============================================================================
 END OF RATIONAL METHOD ANALYSIS
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