Appendix I 2016 Hydrology Report

Appendices

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PRELIMINARY HYDROLOGY

ARMSTRONG RANCH SPECIFIC PLAN
A PORTION OF THE ONTARIO RANCH

City of Ontario
County of San Bernardino

Prepared Date: November 2015

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11/06/15
Date

Preliminary Hydrology
Armstrong Ranch Specific Plan
The Ontario Ranch

City of Ontario, County of San Bernardino

JN 803-50
November 2015

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Armstrong Ranch
Preliminary Hydrology

A. Discussion

PROJECT DESCRIPTION

The Armstrong Ranch Specific Plan (ARSP) project site is an approximately 199-acre parcel bounded by Riverside Drive on the north, Chino Avenue on the south, Vineyard Avenue on the west and Cucamonga Creek Channel on the east. The ARSP is a part of the western portion of the Ontario Ranch (formerly known as the New Model Colony). The ARSP proposes to develop the site for residential housing with trails, parks and an elementary school parcel. The project site was named after its former owners, the Armstrong family who farmed the land as a commercial nursery, a forerunner of the Armstrong Garden Centers who still exist as retail purveyors of nursery plants and gardening supplies. See ARSP Exhibit.

EXISTING SITE CONDITIONS

The project site consists of undeveloped land formerly used for agricultural purposes and now generally laying fallow and unused. The site has been leveled and graded for various agricultural purposes in the past. The topography is very flat in the interiors due to the agricultural grading but generally slopes very gently from north to south from elevation 780 at Riverside Drive to 746 at Chino Avenue. Due to the berming of soil at the southern boundary of the ARSP and the agricultural grading, there are many internal sumps and other low spots that create shallow ponds that ultimately outlet to Chino Avenue. Riverside Drive and Chino Avenue are partially improved streets that function to carry east and west traffic around the ARSP. Carpenter Avenue exists as a paper street only while Hellman Avenue is a poorly paved road that serves as a minor north south connection between Riverside Drive and Chino Avenue. There are abandoned cow feeding bins and related milking buildings and other types of fenced areas. See Orthophoto Exhibit.

EXISTING STORM DRAIN FACILITIES

San Bernardino County Flood Control District (SBCFCD) constructed the Riverside Drive Storm Drain Segment No. 2, Phase II (RDSD2) in the early part of this century. The RDSD2 storm drain system consists of a storm drain pipe in the west 700+/- feet of Riverside Drive (72" RCP), a storm drain pipe in Vineyard Avenue from Riverside Drive to Chino Avenue (120" RCP), and a storm drain pipe in Chino Avenue to just east of Hellman Avenue (144" RCP). The RDSD2 storm drain system outlets the storm waters into the Lower Cucamonga Spreading Grounds. The ARSP was hydrologically tabled to drain into the RDSD2 system. See Existing Storm Drain Exhibit.

PROPOSED STORM DRAIN SYSTEM

The New Model Colony (now the Ontario Ranch) Master Plan of Drainage proposes two additional storm drain segments to be constructed to complete the master plan of drainage for the ARSP. A 60" storm drain (CHIN-XI-2) will be constructed from the existing 144" storm drain in Chino Drive northerly in Hellman Avenue to the southwest corner of the northerly planning area (PA 6). In the Master Plan of Drainage the CHIN-XI-2 called for a 42" storm drain; however the more detailed hydrologic calculations contained in this report requires a larger 60" storm drain pipe. A 72" storm drain will be constructed in Riverside Drive beginning at the east end of the existing 72" storm drain (RVSD-IV-1) westerly to Carpenter Drive. This extension will convey storm waters from the north side of Riverside Drive into the RDSD2 system. See Proposed Storm Drain Exhibit.

The interior storm drain systems will be designed to intercept and convey a 100-year storm frequency storm in accordance with the City of Ontario's drainage policies.

EXISTING HYDROLOGY

The existing undeveloped 100-year peak storm flows exiting the ARSP total 313 cfs. It is difficult to determine exactly where the storm flows would ultimately leave the ARSP due to the agricultural grading that has occurred in the past but ultimately, the storm waters would drain to the south across Chino Avenue. See Existing Hydrology Map.

PROPOSED HYDROLOGY

The proposed developed 100-year storm flows leaving the ARSP total 431 cfs. All of the Ontario Ranch is not subject to hydromodification according to the San Bernardino County Flood Control Facilities in Zones 1, 2, and 3 Hydromodification Map. Hydromodification requires that the difference between the pre- and post-development storm flows be mitigated to be equal to or less than the pre-development storm flows. Since hydromodification is not required, the ARSP post-development storm flows can enter the adjacent SBCFCD storm drain facilities and proposed master plan storm drain systems. Although there will be an increase in the storm flow runoff with the development of the ARSP project, through construction of the ARSP in-tract storm drain facilities and the installation of the master plan storm drain systems, the ARSP project will not have significant unavoidable storm drain impacts. See Proposed Hydrology Map.

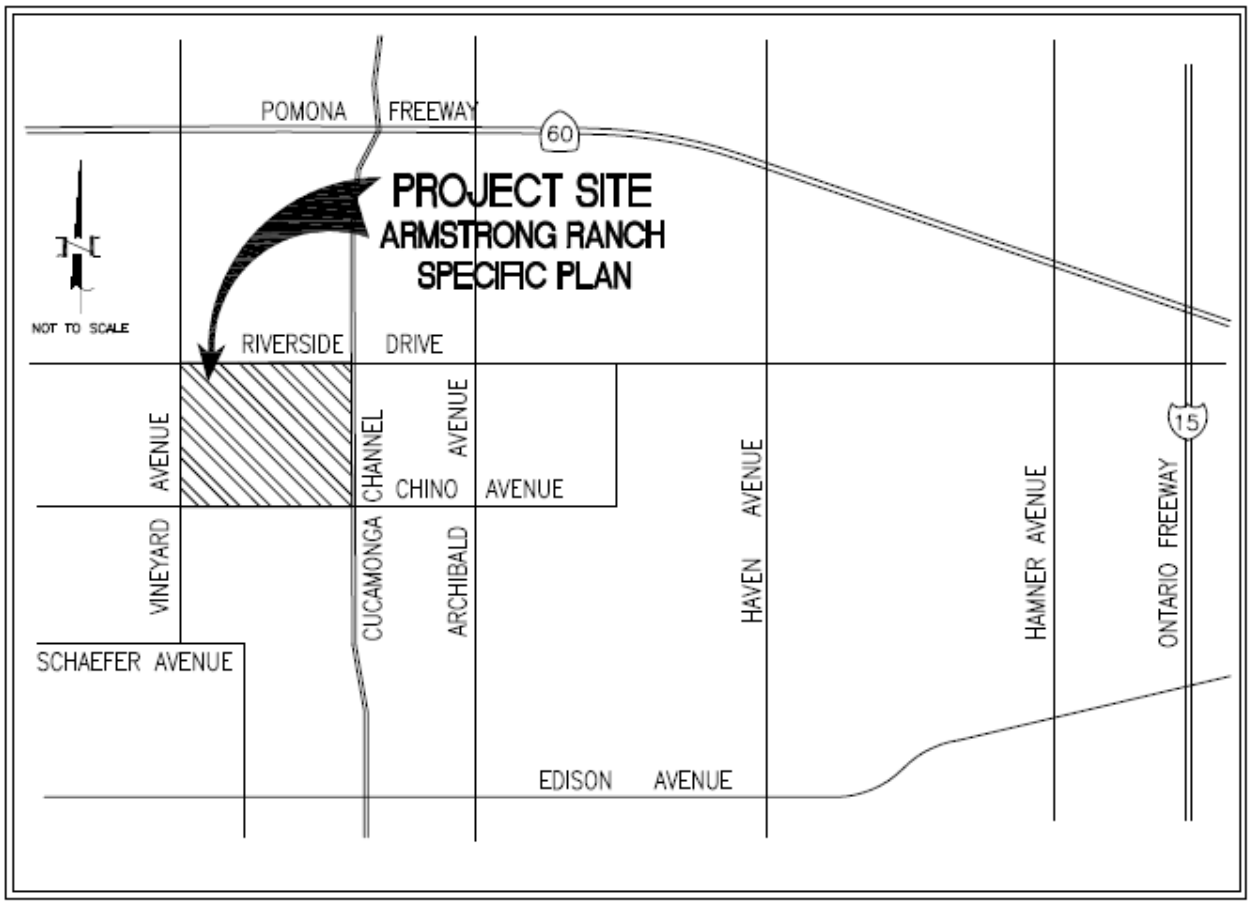
WATER QUALITY AND NPDES

Each storm drain outfall from the ARSP is located adjacent to a park, a parklet, or a greenbelt paseo. These parks, parklets, and paseos will have underground infiltration chambers to infiltrate a portion of the storm waters into the substrata. A diversion weir will be constructed at each outfall to direct the first flush flows (Design Capture Volumes) to a structural BMP (a baffle box or equivalent) that will intercept trash and other pollutants partially cleansing the first flush flows before they enter the underground infiltration chambers for ultimate infiltration into the sub strata. The ARSP soils have excellent infiltration rates according to the on-site infiltration tests. See WQMP Exhibit.

PROJECT LOCATION

The project site lies northeast quadrant of Vineyard Avenue and Chino Avenue, in the city of Ontario, county of San Bernardino.

Latitude: 34.013
Longitude: -117.605
Thomas Brothers Page: 642
Flood Control District Facility: Zone 1



B. Existing Condition Rational Method Hydrology Calculations

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_
*******************************************************************************
*
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
          (c) Copyright 1983-2003 Advanced Engineering Software (aes)
              Ver. 8.0  Release Date: 01/01/2003  License ID 1269

                                Analysis prepared by:

                                    MDS Consulting
                               17320 Redhill Avenue, Suite 350
                                      Irvine, CA 92614
                                       949-721-8821



  ************************** DESCRIPTION OF STUDY
**************************
 * Existing Condition Hydrology Calculation
*
 * 10-year storm
*
 *
*

*******************************************************************************

   FILE NAME: EXIST.DAT
   TIME/DATE OF STUDY: 14:02 11/04/2015

================================================================================
=
   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 = 0.95
   *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

   SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
   USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.9060

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

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

```
0.0150

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


****************************************************************************
*
   FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   800.00
   ELEVATION DATA: UPSTREAM(FEET) =    774.00  DOWNSTREAM(FEET) =    762.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.627
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.889
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   NATURAL POOR COVER
   "BARREN"                   A        1.70      0.42      1.00    78
17.63
   NATURAL POOR COVER
   "BARREN"                   C        2.20      0.18      1.00    91
17.63
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA RUNOFF(CFS) =      5.64
   TOTAL AREA(ACRES) =      3.90   PEAK FLOW RATE(CFS) =      5.64


****************************************************************************
*
   FLOW PROCESS FROM NODE      2.00 TO NODE      5.00 IS CODE =  52

----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    762.00  DOWNSTREAM(FEET) =    748.40
   CHANNEL LENGTH THRU SUBAREA(FEET) =  2250.00   CHANNEL SLOPE =  0.0060
   CHANNEL FLOW THRU SUBAREA(CFS) =      5.64
   FLOW VELOCITY(FEET/SEC) =   1.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  22.22   Tc(MIN.) =  39.85
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =  3050.00 FEET.
```

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****************************************************************************
*
   FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  39.85
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.158
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   NATURAL POOR COVER
   "BARREN"                    A       22.30      0.42      1.00    78
   NATURAL POOR COVER
   "BARREN"                    C       41.80      0.18      1.00    91
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA AREA(ACRES) =   64.10      SUBAREA RUNOFF(CFS) =   51.69
   EFFECTIVE AREA(ACRES) =     68.00   AREA-AVERAGED Fm(INCH/HR) =  0.26
   AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     68.00       PEAK FLOW RATE(CFS) =      54.77


****************************************************************************
*
   FLOW PROCESS FROM NODE     10.00 TO NODE     13.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
   ELEVATION DATA: UPSTREAM(FEET) =    774.00  DOWNSTREAM(FEET) =    761.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   19.832
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.760
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   NATURAL POOR COVER
   "BARREN"                    A        6.40      0.42      1.00    78
19.83
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA RUNOFF(CFS) =      7.74
   TOTAL AREA(ACRES) =      6.40   PEAK FLOW RATE(CFS) =      7.74


****************************************************************************
*
   FLOW PROCESS FROM NODE     13.00 TO NODE     19.00 IS CODE =  52
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----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    761.00  DOWNSTREAM(FEET) =    751.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1950.00   CHANNEL SLOPE =  0.0051
   CHANNEL FLOW THRU SUBAREA(CFS) =      7.74
   FLOW VELOCITY(FEET/SEC) =   1.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  19.36   Tc(MIN.) =  39.19
   LONGEST FLOWPATH FROM NODE     10.00 TO NODE     19.00 =  2950.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  39.19
   *  10 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
   NATURAL POOR COVER
   "BARREN"                   A       26.30      0.42      1.00    78
   NATURAL POOR COVER
   "BARREN"                   C        7.10      0.18      1.00    91
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA AREA(ACRES) =   33.40      SUBAREA RUNOFF(CFS) =   24.17
   EFFECTIVE AREA(ACRES) =     39.80   AREA-AVERAGED Fm(INCH/HR) =  0.37
   AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     39.80       PEAK FLOW RATE(CFS) =      28.51


****************************************************************************
*
   FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 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.) =  39.19
   RAINFALL INTENSITY(INCH/HR) =   1.17
   AREA-AVERAGED Fm(INCH/HR) =  0.37
   AREA-AVERAGED Fp(INCH/HR) =  0.37
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =    39.80
   TOTAL STREAM AREA(ACRES) =    39.80
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     28.51
```

```
****************************************************************************
*
   FLOW PROCESS FROM NODE     15.00 TO NODE     17.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   900.00
   ELEVATION DATA: UPSTREAM(FEET) =    779.50  DOWNSTREAM(FEET) =    765.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.215
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.853
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   NATURAL POOR COVER
   "BARREN"                   A        5.20      0.42      1.00    78
18.22
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA RUNOFF(CFS) =      6.72
   TOTAL AREA(ACRES) =      5.20   PEAK FLOW RATE(CFS) =      6.72


****************************************************************************
*
   FLOW PROCESS FROM NODE     17.00 TO NODE     19.00 IS CODE =  52

----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    765.00  DOWNSTREAM(FEET) =    751.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  2350.00   CHANNEL SLOPE =  0.0060
   CHANNEL FLOW THRU SUBAREA(CFS) =      6.72
   FLOW VELOCITY(FEET/SEC) =   1.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  22.41   Tc(MIN.) =  40.62
   LONGEST FLOWPATH FROM NODE     15.00 TO NODE     19.00 =  3250.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  40.62
```

```
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.145
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL POOR COVER
"BARREN"                   A       34.20      0.42      1.00    78
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
SUBAREA AREA(ACRES) =   34.20      SUBAREA RUNOFF(CFS) =   22.43
EFFECTIVE AREA(ACRES) =     39.40   AREA-AVERAGED Fm(INCH/HR) =  0.42
AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =     39.40       PEAK FLOW RATE(CFS) =      25.85


****************************************************************************
*
FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 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.) =  40.62
RAINFALL INTENSITY(INCH/HR) =   1.14
AREA-AVERAGED Fm(INCH/HR) =  0.42
AREA-AVERAGED Fp(INCH/HR) =  0.42
AREA-AVERAGED Ap =  1.00
EFFECTIVE STREAM AREA(ACRES) =    39.40
TOTAL STREAM AREA(ACRES) =    39.40
PEAK FLOW RATE(CFS) AT CONFLUENCE =     25.85

** CONFLUENCE DATA **
 STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
 NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
    1     28.51  39.19    1.170  0.37( 0.37) 1.00    39.8      10.00
    2     25.85  40.62    1.145  0.42( 0.42) 1.00    39.4      15.00

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

** PEAK FLOW RATE TABLE **
 STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
 NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
    1     54.30  39.19    1.170  0.39( 0.39) 1.00    77.8      10.00
    2     53.46  40.62    1.145  0.39( 0.39) 1.00    79.2      15.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     54.30    Tc(MIN.) =    39.19
EFFECTIVE AREA(ACRES) =    77.81   AREA-AVERAGED Fm(INCH/HR) =  0.39
AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =     79.20
LONGEST FLOWPATH FROM NODE     15.00 TO NODE     19.00 =  3250.00 FEET.


****************************************************************************
*
FLOW PROCESS FROM NODE     20.00 TO NODE     22.00 IS CODE =  21
```

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----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   850.00
   ELEVATION DATA: UPSTREAM(FEET) =    783.20  DOWNSTREAM(FEET) =    772.70

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.775
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.819
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   NATURAL POOR COVER
   "BARREN"                   A        5.00      0.42      1.00    78
18.77
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA RUNOFF(CFS) =      6.31
   TOTAL AREA(ACRES) =      5.00   PEAK FLOW RATE(CFS) =      6.31


****************************************************************************
*
   FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 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.) =  18.77
   RAINFALL INTENSITY(INCH/HR) =   1.82
   AREA-AVERAGED Fm(INCH/HR) =  0.42
   AREA-AVERAGED Fp(INCH/HR) =  0.42
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =     5.00
   TOTAL STREAM AREA(ACRES) =     5.00
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.31


****************************************************************************
*
   FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   850.00
   ELEVATION DATA: UPSTREAM(FEET) =    779.50  DOWNSTREAM(FEET) =    772.70
```

```
   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.479
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.727
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   NATURAL POOR COVER
   "BARREN"                   C        4.80      0.18      1.00    91
20.48
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA RUNOFF(CFS) =      6.68
   TOTAL AREA(ACRES) =      4.80   PEAK FLOW RATE(CFS) =      6.68


****************************************************************************
*
   FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =   1

----------------------------------------------------------------------------
-
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
   >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

============================================================================
=
   TOTAL NUMBER OF STREAMS =  2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
   TIME OF CONCENTRATION(MIN.) =  20.48
   RAINFALL INTENSITY(INCH/HR) =   1.73
   AREA-AVERAGED Fm(INCH/HR) =  0.18
   AREA-AVERAGED Fp(INCH/HR) =  0.18
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =     4.80
   TOTAL STREAM AREA(ACRES) =     4.80
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.68

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      6.31  18.77    1.819  0.42( 0.42) 1.00     5.0      20.00
       2      6.68  20.48    1.727  0.18( 0.18) 1.00     4.8      21.00

   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     12.81  18.77    1.819  0.31( 0.31) 1.00     9.4      20.00
       2     12.58  20.48    1.727  0.30( 0.30) 1.00     9.8      21.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     12.81    Tc(MIN.) =    18.77
   EFFECTIVE AREA(ACRES) =     9.40   AREA-AVERAGED Fm(INCH/HR) =  0.31
   AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      9.80
   LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =   850.00 FEET.
```

```
****************************************************************************
*
   FLOW PROCESS FROM NODE     22.00 TO NODE     25.00 IS CODE =  52

----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    772.70  DOWNSTREAM(FEET) =    754.50
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1800.00   CHANNEL SLOPE =  0.0101
   CHANNEL FLOW THRU SUBAREA(CFS) =     12.81
   FLOW VELOCITY(FEET/SEC) =   2.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  11.20   Tc(MIN.) =  29.98
   LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =  2650.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  29.98
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.374
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   NATURAL POOR COVER
   "BARREN"                    A       26.70      0.42      1.00    78
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA AREA(ACRES) =   26.70      SUBAREA RUNOFF(CFS) =   23.02
   EFFECTIVE AREA(ACRES) =     36.10   AREA-AVERAGED Fm(INCH/HR) =  0.39
   AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     36.50       PEAK FLOW RATE(CFS) =      32.06


****************************************************************************
*
   FLOW PROCESS FROM NODE     30.00 TO NODE     32.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
   ELEVATION DATA: UPSTREAM(FEET) =    774.00  DOWNSTREAM(FEET) =    765.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.360
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.338
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
```

```
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   COMMERCIAL                  A        0.30      0.98       0.10    32
12.36
   NATURAL POOR COVER
   "BARREN"                    A        0.20      0.42       1.00    78
21.35
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.49
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.46
   SUBAREA RUNOFF(CFS) =      0.95
   TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      0.95


****************************************************************************
*
   FLOW PROCESS FROM NODE     32.00 TO NODE     34.00 IS CODE =  52

----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    765.00  DOWNSTREAM(FEET) =    755.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.00   CHANNEL SLOPE =  0.0091
   NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
   CHANNEL FLOW THRU SUBAREA(CFS) =      0.95
   FLOW VELOCITY(FEET/SEC) =   1.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  12.82   Tc(MIN.) =  25.18
   LONGEST FLOWPATH FROM NODE     30.00 TO NODE     34.00 =  2100.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  25.18
   *  10 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
   COMMERCIAL                  A        0.40      0.98       0.10    32
   NATURAL POOR COVER
   "BARREN"                    A        0.60      0.42       1.00    78
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.64
   SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    1.11
   EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.27
   AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  0.58
   TOTAL AREA(ACRES) =      1.50       PEAK FLOW RATE(CFS) =       1.70


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

```
   FLOW PROCESS FROM NODE     34.00 TO NODE     36.00 IS CODE =  52

----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    755.00  DOWNSTREAM(FEET) =    749.40
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1400.00   CHANNEL SLOPE =  0.0040
   CHANNEL FLOW THRU SUBAREA(CFS) =      1.70
   FLOW VELOCITY(FEET/SEC) =   1.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  22.17   Tc(MIN.) =  47.35
   LONGEST FLOWPATH FROM NODE     30.00 TO NODE     36.00 =  3500.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  47.35
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.044
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   COMMERCIAL                 A        0.50      0.98      0.10    32
   NATURAL POOR COVER
   "BARREN"                   A        3.50      0.42      1.00    78
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.89
   SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    2.41
   EFFECTIVE AREA(ACRES) =      5.50   AREA-AVERAGED Fm(INCH/HR) =  0.35
   AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  0.80
   TOTAL AREA(ACRES) =      5.50       PEAK FLOW RATE(CFS) =       3.45


****************************************************************************
*
   FLOW PROCESS FROM NODE     36.00 TO NODE     49.00 IS CODE =  52

----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    749.40  DOWNSTREAM(FEET) =    746.10
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1200.00   CHANNEL SLOPE =  0.0028
   CHANNEL FLOW THRU SUBAREA(CFS) =      3.45
   FLOW VELOCITY(FEET/SEC) =   1.02 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  19.68   Tc(MIN.) =  67.03
   LONGEST FLOWPATH FROM NODE     30.00 TO NODE     49.00 =  4700.00 FEET.
```

```
****************************************************************************
*
   FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  67.03
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.848
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   COMMERCIAL                A        0.36      0.98       0.10    32
   NATURAL POOR COVER
   "BARREN"                  A        3.64      0.42       1.00    78
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.92
   SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    1.66
   EFFECTIVE AREA(ACRES) =      9.50   AREA-AVERAGED Fm(INCH/HR) =  0.36
   AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  0.85
   TOTAL AREA(ACRES) =      9.50       PEAK FLOW RATE(CFS) =       4.14


****************************************************************************
*
   FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 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.) =  67.03
   RAINFALL INTENSITY(INCH/HR) =   0.85
   AREA-AVERAGED Fm(INCH/HR) =  0.36
   AREA-AVERAGED Fp(INCH/HR) =  0.43
   AREA-AVERAGED Ap =  0.85
   EFFECTIVE STREAM AREA(ACRES) =     9.50
   TOTAL STREAM AREA(ACRES) =     9.50
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.14


****************************************************************************
*
   FLOW PROCESS FROM NODE     40.00 TO NODE     42.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   740.00
   ELEVATION DATA: UPSTREAM(FEET) =    773.50  DOWNSTREAM(FEET) =    761.00
```

```
   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.685
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.953
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   NATURAL POOR COVER
   "BARREN"                   A        1.60      0.42      1.00    78
16.68
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA RUNOFF(CFS) =      2.21
   TOTAL AREA(ACRES) =      1.60   PEAK FLOW RATE(CFS) =      2.21


****************************************************************************
*
   FLOW PROCESS FROM NODE     42.00 TO NODE     49.00 IS CODE =  52

----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    761.00  DOWNSTREAM(FEET) =    746.10
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1930.00   CHANNEL SLOPE =  0.0077
   CHANNEL FLOW THRU SUBAREA(CFS) =      2.21
   FLOW VELOCITY(FEET/SEC) =   1.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  20.82   Tc(MIN.) =  37.51
   LONGEST FLOWPATH FROM NODE     40.00 TO NODE     49.00 =  2670.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  37.51
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.201
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   NATURAL POOR COVER
   "BARREN"                   A        0.50      0.42      1.00    78
   NATURAL POOR COVER
   "BARREN"                   C        1.80      0.18      1.00    91
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    2.01
   EFFECTIVE AREA(ACRES) =      3.90   AREA-AVERAGED Fm(INCH/HR) =  0.31
   AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      3.90       PEAK FLOW RATE(CFS) =       3.14
```

```
****************************************************************************
*
   FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 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.) =  37.51
   RAINFALL INTENSITY(INCH/HR) =   1.20
   AREA-AVERAGED Fm(INCH/HR) =  0.31
   AREA-AVERAGED Fp(INCH/HR) =  0.31
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =     3.90
   TOTAL STREAM AREA(ACRES) =     3.90
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.14

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      4.14  67.03    0.848  0.43( 0.36) 0.85     9.5      30.00
       2      3.14  37.51    1.201  0.31( 0.31) 1.00     3.9      40.00

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

   ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      7.14  37.51    1.201  0.37( 0.34) 0.91     9.2      40.00
       2      6.04  67.03    0.848  0.39( 0.35) 0.90    13.4      30.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      7.14    Tc(MIN.) =    37.51
   EFFECTIVE AREA(ACRES) =     9.22   AREA-AVERAGED Fm(INCH/HR) =  0.34
   AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.91
   TOTAL AREA(ACRES) =     13.40
   LONGEST FLOWPATH FROM NODE     30.00 TO NODE     49.00 =  4700.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     50.00 TO NODE     53.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   432.00
   ELEVATION DATA: UPSTREAM(FEET) =    773.50  DOWNSTREAM(FEET) =    770.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.023
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.824
```

```
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   COMMERCIAL                 A        0.12      0.98      0.10    32
9.02
   NATURAL POOR COVER
   "BARREN"                   A        0.07      0.42      1.00    78
15.58
   COMMERCIAL                 C        0.06      0.57      0.10    69
9.02
   NATURAL POOR COVER
   "BARREN"                   C        0.05      0.18      1.00    91
15.58
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.39
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.46
   SUBAREA RUNOFF(CFS) =      0.71
   TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      0.71


****************************************************************************
*
   FLOW PROCESS FROM NODE     53.00 TO NODE     53.00 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.) =   9.02
   RAINFALL INTENSITY(INCH/HR) =   2.82
   AREA-AVERAGED Fm(INCH/HR) =  0.18
   AREA-AVERAGED Fp(INCH/HR) =  0.39
   AREA-AVERAGED Ap =  0.46
   EFFECTIVE STREAM AREA(ACRES) =     0.30
   TOTAL STREAM AREA(ACRES) =     0.30
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.71


****************************************************************************
*
   FLOW PROCESS FROM NODE     51.00 TO NODE     53.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   740.00
   ELEVATION DATA: UPSTREAM(FEET) =    774.00  DOWNSTREAM(FEET) =    770.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.134
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.364
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
(MIN.)
   COMMERCIAL                 A        0.32      0.98      0.10    32
12.13
   COMMERCIAL                 C        0.22      0.57      0.10    69
12.13
   NATURAL POOR COVER
   "BARREN"                   A        0.16      0.42      1.00    78
20.95
   NATURAL POOR COVER
   "BARREN"                   C        0.12      0.18      1.00    91
20.95
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.39
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.41
   SUBAREA RUNOFF(CFS) =      1.63
   TOTAL AREA(ACRES) =      0.82   PEAK FLOW RATE(CFS) =      1.63


****************************************************************************
*
   FLOW PROCESS FROM NODE     53.00 TO NODE     53.00 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.) =  12.13
   RAINFALL INTENSITY(INCH/HR) =   2.36
   AREA-AVERAGED Fm(INCH/HR) =  0.16
   AREA-AVERAGED Fp(INCH/HR) =  0.39
   AREA-AVERAGED Ap =  0.41
   EFFECTIVE STREAM AREA(ACRES) =     0.82
   TOTAL STREAM AREA(ACRES) =     0.82
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.63

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      0.71   9.02    2.824  0.39( 0.18) 0.46     0.3      50.00
       2      1.63  12.13    2.364  0.39( 0.16) 0.41     0.8      51.00

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

   ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      2.18   9.02    2.824  0.39( 0.17) 0.42     0.9      50.00
       2      2.22  12.13    2.364  0.39( 0.17) 0.42     1.1      51.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      2.22    Tc(MIN.) =    12.13
   EFFECTIVE AREA(ACRES) =     1.12   AREA-AVERAGED Fm(INCH/HR) =  0.17
   AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.42
   TOTAL AREA(ACRES) =      1.12
   LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =   740.00 FEET.

============================================================================
```

```
=
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =      1.12  TC(MIN.) =     12.13
   EFFECTIVE AREA(ACRES) =      1.12  AREA-AVERAGED Fm(INCH/HR)=  0.17
   AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.42
   PEAK FLOW RATE(CFS)   =      2.22

   ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      2.18   9.02    2.824  0.39( 0.17) 0.42     0.9      50.00
       2      2.22  12.13    2.364  0.39( 0.17) 0.42     1.1      51.00

================================================================================
=

================================================================================
=
   END OF RATIONAL METHOD ANALYSIS
```

```
_
**************************************************************************
*
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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              Ver. 8.0  Release Date: 01/01/2003  License ID 1269

                              Analysis prepared by:

                                    MDS Consulting
                                17320 Redhill Avenue, Suite 350
                                       Irvine, CA 92614
                                        949-721-8821



  ************************** DESCRIPTION OF STUDY
**************************
 * Existing Condition Hydrology Calculation
*
 * 100-year storm
*
 *
*

**************************************************************************

   FILE NAME: EXIST.DAT
   TIME/DATE OF STUDY: 13:55 11/04/2015

==========================================================================
=
   USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

==========================================================================
=
                      --*TIME-OF-CONCENTRATION MODEL*--

   USER SPECIFIED STORM EVENT(YEAR) =  100.00
   SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
   SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
   *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

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

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

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

```
0.0150

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


****************************************************************************
*
   FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   800.00
   ELEVATION DATA: UPSTREAM(FEET) =    774.00  DOWNSTREAM(FEET) =    762.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.627
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.857
   SUBAREA Tc AND LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   NATURAL POOR COVER
   "BARREN"                   A        1.70      0.14      1.00    93
17.63
   NATURAL POOR COVER
   "BARREN"                   C        2.20      0.00      1.00    98
17.63
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.06
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA RUNOFF(CFS) =      9.81
   TOTAL AREA(ACRES) =      3.90   PEAK FLOW RATE(CFS) =      9.81


****************************************************************************
*
   FLOW PROCESS FROM NODE      2.00 TO NODE      5.00 IS CODE =  52

----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    762.00  DOWNSTREAM(FEET) =    748.40
   CHANNEL LENGTH THRU SUBAREA(FEET) =  2250.00   CHANNEL SLOPE =  0.0060
   CHANNEL FLOW THRU SUBAREA(CFS) =      9.81
   FLOW VELOCITY(FEET/SEC) =   1.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  19.39   Tc(MIN.) =  37.02
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =  3050.00 FEET.
```

```
****************************************************************************
*
   FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  37.02
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.830
   SUBAREA LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   NATURAL POOR COVER
   "BARREN"                   A       22.30      0.14      1.00    93
   NATURAL POOR COVER
   "BARREN"                   C       41.80      0.00      1.00    98
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.05
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA AREA(ACRES) =   64.10      SUBAREA RUNOFF(CFS) =  102.79
   EFFECTIVE AREA(ACRES) =     68.00   AREA-AVERAGED Fm(INCH/HR) =  0.05
   AREA-AVERAGED Fp(INCH/HR) =  0.05  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     68.00       PEAK FLOW RATE(CFS) =     109.00


****************************************************************************
*
   FLOW PROCESS FROM NODE     10.00 TO NODE     13.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
   ELEVATION DATA: UPSTREAM(FEET) =    774.00  DOWNSTREAM(FEET) =    761.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   19.832
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.662
   SUBAREA Tc AND LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   NATURAL POOR COVER
   "BARREN"                   A        6.40      0.14      1.00    93
19.83
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.14
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA RUNOFF(CFS) =     14.53
   TOTAL AREA(ACRES) =      6.40   PEAK FLOW RATE(CFS) =     14.53


****************************************************************************
*
   FLOW PROCESS FROM NODE     13.00 TO NODE     19.00 IS CODE =  52
```

```
------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

========================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    761.00  DOWNSTREAM(FEET) =    751.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1950.00   CHANNEL SLOPE =  0.0051
   CHANNEL FLOW THRU SUBAREA(CFS) =     14.53
   FLOW VELOCITY(FEET/SEC) =   1.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  16.49   Tc(MIN.) =  36.32
   LONGEST FLOWPATH FROM NODE     10.00 TO NODE     19.00 =  2950.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81

------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

========================================================================
=
   MAINLINE Tc(MIN) =  36.32
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.851
   SUBAREA LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   NATURAL POOR COVER
   "BARREN"                   A       26.30      0.14      1.00    93
   NATURAL POOR COVER
   "BARREN"                   C        7.10      0.00      1.00    98
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA AREA(ACRES) =   33.40      SUBAREA RUNOFF(CFS) =   52.34
   EFFECTIVE AREA(ACRES) =     39.80   AREA-AVERAGED Fm(INCH/HR) =  0.12
   AREA-AVERAGED Fp(INCH/HR) =  0.12  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     39.80       PEAK FLOW RATE(CFS) =      62.20


****************************************************************************
*
   FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 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.) =  36.32
   RAINFALL INTENSITY(INCH/HR) =   1.85
   AREA-AVERAGED Fm(INCH/HR) =  0.12
   AREA-AVERAGED Fp(INCH/HR) =  0.12
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =    39.80
   TOTAL STREAM AREA(ACRES) =    39.80
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     62.20
```

```
****************************************************************************
*
   FLOW PROCESS FROM NODE     15.00 TO NODE     17.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   900.00
   ELEVATION DATA: UPSTREAM(FEET) =    779.50  DOWNSTREAM(FEET) =    765.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.215
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.801
   SUBAREA Tc AND LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   NATURAL POOR COVER
   "BARREN"                   A        5.20      0.14      1.00    93
18.22
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.14
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA RUNOFF(CFS) =     12.45
   TOTAL AREA(ACRES) =      5.20   PEAK FLOW RATE(CFS) =     12.45


****************************************************************************
*
   FLOW PROCESS FROM NODE     17.00 TO NODE     19.00 IS CODE =  52

----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    765.00  DOWNSTREAM(FEET) =    751.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  2350.00   CHANNEL SLOPE =  0.0060
   CHANNEL FLOW THRU SUBAREA(CFS) =     12.45
   FLOW VELOCITY(FEET/SEC) =   2.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  19.19   Tc(MIN.) =  37.41
   LONGEST FLOWPATH FROM NODE     15.00 TO NODE     19.00 =  3250.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  37.41
```

```
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.819
   SUBAREA LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   NATURAL POOR COVER
   "BARREN"                    A       34.20      0.14      1.00    93
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.14
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA AREA(ACRES) =   34.20      SUBAREA RUNOFF(CFS) =   51.68
   EFFECTIVE AREA(ACRES) =     39.40   AREA-AVERAGED Fm(INCH/HR) =  0.14
   AREA-AVERAGED Fp(INCH/HR) =  0.14  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     39.40       PEAK FLOW RATE(CFS) =      59.54


****************************************************************************
*
   FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 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.) =  37.41
   RAINFALL INTENSITY(INCH/HR) =   1.82
   AREA-AVERAGED Fm(INCH/HR) =  0.14
   AREA-AVERAGED Fp(INCH/HR) =  0.14
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =    39.40
   TOTAL STREAM AREA(ACRES) =    39.40
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     59.54

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     62.20  36.32    1.851  0.12( 0.12) 1.00    39.8      10.00
       2     59.54  37.41    1.819  0.14( 0.14) 1.00    39.4      15.00

   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    121.12  36.32    1.851  0.13( 0.13) 1.00    78.1      10.00
       2    120.57  37.41    1.819  0.13( 0.13) 1.00    79.2      15.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =    121.12    Tc(MIN.) =    36.32
   EFFECTIVE AREA(ACRES) =    78.06   AREA-AVERAGED Fm(INCH/HR) =  0.13
   AREA-AVERAGED Fp(INCH/HR) =  0.13  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     79.20
   LONGEST FLOWPATH FROM NODE     15.00 TO NODE     19.00 =  3250.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     20.00 TO NODE     22.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   850.00
   ELEVATION DATA: UPSTREAM(FEET) =    783.20  DOWNSTREAM(FEET) =    772.70

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.775
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
   SUBAREA Tc AND LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   NATURAL POOR COVER
   "BARREN"                   A        5.00      0.14      1.00    93
18.77
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.14
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA RUNOFF(CFS) =     11.75
   TOTAL AREA(ACRES) =      5.00   PEAK FLOW RATE(CFS) =     11.75


****************************************************************************
*
   FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 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.) =  18.77
   RAINFALL INTENSITY(INCH/HR) =   2.75
   AREA-AVERAGED Fm(INCH/HR) =  0.14
   AREA-AVERAGED Fp(INCH/HR) =  0.14
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =     5.00
   TOTAL STREAM AREA(ACRES) =     5.00
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.75


****************************************************************************
*
   FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   850.00
   ELEVATION DATA: UPSTREAM(FEET) =    779.50  DOWNSTREAM(FEET) =    772.70
```

```
   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.479
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.611
   SUBAREA Tc AND LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   NATURAL POOR COVER
   "BARREN"                   C        4.80      0.00      1.00    98
20.48
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.00
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA RUNOFF(CFS) =     11.28
   TOTAL AREA(ACRES) =      4.80   PEAK FLOW RATE(CFS) =     11.28


****************************************************************************
*
   FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =   1

----------------------------------------------------------------------------
-
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
   >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

============================================================================
=
   TOTAL NUMBER OF STREAMS =  2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
   TIME OF CONCENTRATION(MIN.) =  20.48
   RAINFALL INTENSITY(INCH/HR) =   2.61
   AREA-AVERAGED Fm(INCH/HR) =  0.00
   AREA-AVERAGED Fp(INCH/HR) =  0.00
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =     4.80
   TOTAL STREAM AREA(ACRES) =     4.80
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.28

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     11.75  18.77    2.751  0.14( 0.14) 1.00     5.0      20.00
       2     11.28  20.48    2.611  0.00( 0.00) 1.00     4.8      21.00

   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     22.64  18.77    2.751  0.07( 0.07) 1.00     9.4      20.00
       2     22.40  20.48    2.611  0.07( 0.07) 1.00     9.8      21.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     22.64    Tc(MIN.) =    18.77
   EFFECTIVE AREA(ACRES) =     9.40   AREA-AVERAGED Fm(INCH/HR) =  0.07
   AREA-AVERAGED Fp(INCH/HR) =  0.07  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      9.80
   LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =   850.00 FEET.
```

```
****************************************************************************
*
   FLOW PROCESS FROM NODE     22.00 TO NODE     25.00 IS CODE =  52

----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    772.70  DOWNSTREAM(FEET) =    754.50
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1800.00   CHANNEL SLOPE =  0.0101
   CHANNEL FLOW THRU SUBAREA(CFS) =     22.64
   FLOW VELOCITY(FEET/SEC) =   3.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =   9.63   Tc(MIN.) =  28.40
   LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =  2650.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  28.40
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.146
   SUBAREA LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   NATURAL POOR COVER
   "BARREN"                    A       26.70      0.14      1.00    93
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.14
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA AREA(ACRES) =   26.70      SUBAREA RUNOFF(CFS) =   48.20
   EFFECTIVE AREA(ACRES) =     36.10   AREA-AVERAGED Fm(INCH/HR) =  0.12
   AREA-AVERAGED Fp(INCH/HR) =  0.12  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =     36.50       PEAK FLOW RATE(CFS) =      65.73


****************************************************************************
*
   FLOW PROCESS FROM NODE     30.00 TO NODE     32.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
   ELEVATION DATA: UPSTREAM(FEET) =    774.00  DOWNSTREAM(FEET) =    765.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.360
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.535
   SUBAREA Tc AND LOSS RATE DATA(AMC III):
```

```
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   COMMERCIAL                  A        0.30      0.80       0.10    52
12.36
   NATURAL POOR COVER
   "BARREN"                    A        0.20      0.14       1.00    93
21.35
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.46
   SUBAREA RUNOFF(CFS) =      1.54
   TOTAL AREA(ACRES) =      0.50   PEAK FLOW RATE(CFS) =      1.54


****************************************************************************
*
   FLOW PROCESS FROM NODE     32.00 TO NODE     34.00 IS CODE =  52

----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    765.00  DOWNSTREAM(FEET) =    755.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.00   CHANNEL SLOPE =  0.0091
   CHANNEL FLOW THRU SUBAREA(CFS) =      1.54
   FLOW VELOCITY(FEET/SEC) =   1.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  11.78   Tc(MIN.) =  24.14
   LONGEST FLOWPATH FROM NODE     30.00 TO NODE     34.00 =  2100.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  24.14
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.366
   SUBAREA LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
        LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   COMMERCIAL                  A        0.40      0.80       0.10    52
   NATURAL POOR COVER
   "BARREN"                    A        0.60      0.14       1.00    93
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.64
   SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    2.02
   EFFECTIVE AREA(ACRES) =      1.50   AREA-AVERAGED Fm(INCH/HR) =  0.11
   AREA-AVERAGED Fp(INCH/HR) =  0.19  AREA-AVERAGED Ap =  0.58
   TOTAL AREA(ACRES) =      1.50       PEAK FLOW RATE(CFS) =       3.04


****************************************************************************
*
   FLOW PROCESS FROM NODE     34.00 TO NODE     36.00 IS CODE =  52
```

```
----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    755.00  DOWNSTREAM(FEET) =    749.40
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1400.00   CHANNEL SLOPE =  0.0040
   CHANNEL FLOW THRU SUBAREA(CFS) =      3.04
   FLOW VELOCITY(FEET/SEC) =   1.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  19.59   Tc(MIN.) =  43.73
   LONGEST FLOWPATH FROM NODE     30.00 TO NODE     36.00 =  3500.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  43.73
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.656
   SUBAREA LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   COMMERCIAL                 A        0.50      0.80       0.10    52
   NATURAL POOR COVER
   "BARREN"                   A        3.50      0.14       1.00    93
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.15
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.89
   SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    5.49
   EFFECTIVE AREA(ACRES) =      5.50   AREA-AVERAGED Fm(INCH/HR) =  0.13
   AREA-AVERAGED Fp(INCH/HR) =  0.16  AREA-AVERAGED Ap =  0.80
   TOTAL AREA(ACRES) =      5.50       PEAK FLOW RATE(CFS) =       7.57


****************************************************************************
*
   FLOW PROCESS FROM NODE     36.00 TO NODE     49.00 IS CODE =  52

----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    749.40  DOWNSTREAM(FEET) =    746.10
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1200.00   CHANNEL SLOPE =  0.0028
   CHANNEL FLOW THRU SUBAREA(CFS) =      7.57
   FLOW VELOCITY(FEET/SEC) =   1.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  16.36   Tc(MIN.) =  60.09
   LONGEST FLOWPATH FROM NODE     30.00 TO NODE     49.00 =  4700.00 FEET.


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

```
*
   FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  60.09
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.369
   SUBAREA LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   COMMERCIAL                 A        0.36      0.80       0.10    52
   NATURAL POOR COVER
   "BARREN"                   A        3.64      0.14       1.00    93
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.15
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.92
   SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    4.44
   EFFECTIVE AREA(ACRES) =      9.50   AREA-AVERAGED Fm(INCH/HR) =  0.13
   AREA-AVERAGED Fp(INCH/HR) =  0.15  AREA-AVERAGED Ap =  0.85
   TOTAL AREA(ACRES) =      9.50       PEAK FLOW RATE(CFS) =      10.59


****************************************************************************
*
   FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 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.) =  60.09
   RAINFALL INTENSITY(INCH/HR) =   1.37
   AREA-AVERAGED Fm(INCH/HR) =  0.13
   AREA-AVERAGED Fp(INCH/HR) =  0.15
   AREA-AVERAGED Ap =  0.85
   EFFECTIVE STREAM AREA(ACRES) =     9.50
   TOTAL STREAM AREA(ACRES) =     9.50
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.59


****************************************************************************
*
   FLOW PROCESS FROM NODE     40.00 TO NODE     42.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   740.00
   ELEVATION DATA: UPSTREAM(FEET) =    773.50  DOWNSTREAM(FEET) =    761.00

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

```
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.685
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.953
   SUBAREA Tc AND LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   NATURAL POOR COVER
   "BARREN"                   A        1.60      0.14      1.00    93
16.68
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.14
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA RUNOFF(CFS) =      4.05
   TOTAL AREA(ACRES) =      1.60   PEAK FLOW RATE(CFS) =      4.05


****************************************************************************
*
   FLOW PROCESS FROM NODE     42.00 TO NODE     49.00 IS CODE =  52

----------------------------------------------------------------------------
-
   >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =    761.00  DOWNSTREAM(FEET) =    746.10
   CHANNEL LENGTH THRU SUBAREA(FEET) =  1930.00   CHANNEL SLOPE =  0.0077
   CHANNEL FLOW THRU SUBAREA(CFS) =      4.05
   FLOW VELOCITY(FEET/SEC) =   1.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
   TRAVEL TIME(MIN.) =  18.22   Tc(MIN.) =  34.91
   LONGEST FLOWPATH FROM NODE     40.00 TO NODE     49.00 =  2670.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  34.91
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.896
   SUBAREA LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   NATURAL POOR COVER
   "BARREN"                   A        0.50      0.14      1.00    93
   NATURAL POOR COVER
   "BARREN"                   C        1.80      0.00      1.00    98
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.03
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
   SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    3.86
   EFFECTIVE AREA(ACRES) =      3.90   AREA-AVERAGED Fm(INCH/HR) =  0.08
   AREA-AVERAGED Fp(INCH/HR) =  0.08  AREA-AVERAGED Ap =  1.00
   TOTAL AREA(ACRES) =      3.90       PEAK FLOW RATE(CFS) =       6.39


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

```
*
   FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 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.) =  34.91
   RAINFALL INTENSITY(INCH/HR) =   1.90
   AREA-AVERAGED Fm(INCH/HR) =  0.08
   AREA-AVERAGED Fp(INCH/HR) =  0.08
   AREA-AVERAGED Ap =  1.00
   EFFECTIVE STREAM AREA(ACRES) =     3.90
   TOTAL STREAM AREA(ACRES) =     3.90
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.39

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     10.59  60.09    1.369  0.15( 0.13) 0.85     9.5      30.00
       2      6.39  34.91    1.896  0.08( 0.08) 1.00     3.9      40.00

   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     15.16  34.91    1.896  0.12( 0.11) 0.91     9.4      40.00
       2     15.13  60.09    1.369  0.13( 0.11) 0.90    13.4      30.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     15.16    Tc(MIN.) =    34.91
   EFFECTIVE AREA(ACRES) =     9.42   AREA-AVERAGED Fm(INCH/HR) =  0.11
   AREA-AVERAGED Fp(INCH/HR) =  0.12  AREA-AVERAGED Ap =  0.91
   TOTAL AREA(ACRES) =     13.40
   LONGEST FLOWPATH FROM NODE     30.00 TO NODE     49.00 =  4700.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     50.00 TO NODE     53.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   432.00
   ELEVATION DATA: UPSTREAM(FEET) =    773.50  DOWNSTREAM(FEET) =    770.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.023
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.270
   SUBAREA Tc AND LOSS RATE DATA(AMC III):
```

```
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   COMMERCIAL                 A        0.12      0.80      0.10    52
9.02
   NATURAL POOR COVER
   "BARREN"                   A        0.07      0.14      1.00    93
15.58
   COMMERCIAL                 C        0.06      0.27      0.10    86
9.02
   NATURAL POOR COVER
   "BARREN"                   C        0.05      0.00      1.00    98
15.58
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.15
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.46
   SUBAREA RUNOFF(CFS) =      1.13
   TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      1.13


****************************************************************************
*
   FLOW PROCESS FROM NODE     53.00 TO NODE     53.00 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.) =   9.02
   RAINFALL INTENSITY(INCH/HR) =   4.27
   AREA-AVERAGED Fm(INCH/HR) =  0.07
   AREA-AVERAGED Fp(INCH/HR) =  0.15
   AREA-AVERAGED Ap =  0.46
   EFFECTIVE STREAM AREA(ACRES) =     0.30
   TOTAL STREAM AREA(ACRES) =     0.30
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.13


****************************************************************************
*
   FLOW PROCESS FROM NODE     51.00 TO NODE     53.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   740.00
   ELEVATION DATA: UPSTREAM(FEET) =    774.00  DOWNSTREAM(FEET) =    770.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.134
   * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.574
   SUBAREA Tc AND LOSS RATE DATA(AMC III):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
```

```
   COMMERCIAL                  A        0.32      0.80      0.10    52
12.13
   COMMERCIAL                  C        0.22      0.27      0.10    86
12.13
   NATURAL POOR COVER
   "BARREN"                    A        0.16      0.14      1.00    93
20.95
   NATURAL POOR COVER
   "BARREN"                    C        0.12      0.00      1.00    98
20.95
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.16
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.41
   SUBAREA RUNOFF(CFS) =      2.59
   TOTAL AREA(ACRES) =      0.82   PEAK FLOW RATE(CFS) =      2.59


****************************************************************************
*
   FLOW PROCESS FROM NODE     53.00 TO NODE     53.00 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.) =  12.13
   RAINFALL INTENSITY(INCH/HR) =   3.57
   AREA-AVERAGED Fm(INCH/HR) =  0.07
   AREA-AVERAGED Fp(INCH/HR) =  0.16
   AREA-AVERAGED Ap =  0.41
   EFFECTIVE STREAM AREA(ACRES) =     0.82
   TOTAL STREAM AREA(ACRES) =     0.82
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.59

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      1.13   9.02    4.270  0.15( 0.07) 0.46     0.3      50.00
       2      2.59  12.13    3.574  0.16( 0.07) 0.41     0.8      51.00

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

   ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      3.44   9.02    4.270  0.16( 0.07) 0.42     0.9      50.00
       2      3.54  12.13    3.574  0.16( 0.07) 0.42     1.1      51.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      3.54    Tc(MIN.) =    12.13
   EFFECTIVE AREA(ACRES) =     1.12   AREA-AVERAGED Fm(INCH/HR) =  0.07
   AREA-AVERAGED Fp(INCH/HR) =  0.16  AREA-AVERAGED Ap =  0.42
   TOTAL AREA(ACRES) =      1.12
   LONGEST FLOWPATH FROM NODE     51.00 TO NODE     53.00 =   740.00 FEET.

============================================================================
=
```

```
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =      1.12  TC(MIN.) =     12.13
   EFFECTIVE AREA(ACRES) =      1.12  AREA-AVERAGED Fm(INCH/HR)=  0.07
   AREA-AVERAGED Fp(INCH/HR) =  0.16  AREA-AVERAGED Ap =  0.42
   PEAK FLOW RATE(CFS)   =      3.54

   ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      3.44   9.02    4.270  0.16( 0.07) 0.42     0.9      50.00
       2      3.54  12.13    3.574  0.16( 0.07) 0.42     1.1      51.00

================================================================================
=

================================================================================
=
   END OF RATIONAL METHOD ANALYSIS
```

C. Developed Condition Rational Method Hydrology Calculations

```
_
**************************************************************************
*
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
          (c) Copyright 1983-2003 Advanced Engineering Software (aes)
              Ver. 8.0  Release Date: 01/01/2003  License ID 1269

                              Analysis prepared by:

                                  MDS Consulting
                            17320 Redhill Avenue, Suite 350
                                   Irvine, CA 92614
                                   949-721-8821



  ************************* DESCRIPTION OF STUDY
*************************
 * Armstrong Ranch, City of Ontario
*
 * Preliminary Hydrology
*
 * 10-year storm

**************************************************************************

   FILE NAME: 80350.DAT
   TIME/DATE OF STUDY: 12:20 11/04/2015

==========================================================================
=
   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 = 0.95
   *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
   10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.906
   100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.370
   COMPUTED RAINFALL INTENSITY DATA:
   STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) = 0.9151
   SLOPE OF INTENSITY DURATION CURVE = 0.6000

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

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

```
   1   18.0     13.0    0.020/0.020/ ---    0.50    2.00 0.0313 0.167
0.0150
   2   32.0     27.0    0.020/0.020/ ---    0.67    2.00 0.0313 0.167
0.0150

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


****************************************************************************
*
   FLOW PROCESS FROM NODE      1.00 TO NODE      3.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   860.00
   ELEVATION DATA: UPSTREAM(FEET) =    779.70  DOWNSTREAM(FEET) =    775.20

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.970
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.294
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   COMMERCIAL                 A        1.06      0.98      0.10    32
12.97
   PUBLIC PARK                A        0.44      0.98      0.85    32
20.61
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.32
   SUBAREA RUNOFF(CFS) =      2.68
   TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      2.68


****************************************************************************
*
   FLOW PROCESS FROM NODE      3.00 TO NODE      5.00 IS CODE =  62

----------------------------------------------------------------------------
-
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STREET TABLE SECTION #  1 USED)<<<<<

============================================================================
=
   UPSTREAM ELEVATION(FEET) =  775.20  DOWNSTREAM ELEVATION(FEET) =  767.50
   STREET LENGTH(FEET) =   960.00   CURB HEIGHT(INCHES) =  6.0
   STREET HALFWIDTH(FEET) = 18.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
   INSIDE STREET CROSSFALL(DECIMAL) =  0.020
```

```
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =
0.0150

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.94
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET) =  0.40
     HALFSTREET FLOOD WIDTH(FEET) =   12.28
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.32
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.94
   STREET FLOW TRAVEL TIME(MIN.) =   6.89   Tc(MIN.) =  19.86
   *  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
   COMMERCIAL                 A        1.50      0.98      0.10    32
   PUBLIC PARK                A        0.30      0.98      0.85    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.23
   SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    2.52
   EFFECTIVE AREA(ACRES) =      3.30    AREA-AVERAGED Fm(INCH/HR) =  0.26
   AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.27
   TOTAL AREA(ACRES) =      3.30        PEAK FLOW RATE(CFS) =       4.50

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  13.03
   FLOW VELOCITY(FEET/SEC.) =  2.38   DEPTH*VELOCITY(FT*FT/SEC.) =   1.00
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =  1820.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE      5.00 TO NODE     10.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   760.50  DOWNSTREAM(FEET) =   754.60
   FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.3 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  13.67
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      4.50
   PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  19.92
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =  1870.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =   1

----------------------------------------------------------------------------
-
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
================================================================================
=
   TOTAL NUMBER OF STREAMS =  2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
   TIME OF CONCENTRATION(MIN.) =  19.92
   RAINFALL INTENSITY(INCH/HR) =   1.77
   AREA-AVERAGED Fm(INCH/HR) =  0.26
   AREA-AVERAGED Fp(INCH/HR) =  0.98
   AREA-AVERAGED Ap =  0.27
   EFFECTIVE STREAM AREA(ACRES) =     3.30
   TOTAL STREAM AREA(ACRES) =     3.30
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.50


****************************************************************************
*
   FLOW PROCESS FROM NODE      7.00 TO NODE      9.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

================================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   850.00
   ELEVATION DATA: UPSTREAM(FEET) =    773.30  DOWNSTREAM(FEET) =    762.30

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.782
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.212
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        4.18      0.98      0.50    32
13.78
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA RUNOFF(CFS) =      6.49
   TOTAL AREA(ACRES) =      4.18   PEAK FLOW RATE(CFS) =      6.49


****************************************************************************
*
   FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

================================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   755.30  DOWNSTREAM(FEET) =   754.60
   FLOW LENGTH(FEET) =   190.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.9 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.20
   ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      6.49
   PIPE TRAVEL TIME(MIN.) =   0.75    Tc(MIN.) =  14.54
```

```
   LONGEST FLOWPATH FROM NODE      7.00 TO NODE     10.00 =  1040.00 FEET.

****************************************************************************
*
   FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 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.) =  14.54
   RAINFALL INTENSITY(INCH/HR) =   2.14
   AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.98
   AREA-AVERAGED Ap =  0.50
   EFFECTIVE STREAM AREA(ACRES) =     4.18
   TOTAL STREAM AREA(ACRES) =     4.18
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.49

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      4.50  19.92    1.773  0.98( 0.26) 0.27     3.3       1.00
       2      6.49  14.54    2.142  0.98( 0.49) 0.50     4.2       7.00

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

   ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     10.57  14.54    2.142  0.98( 0.40) 0.42     6.6       7.00
       2      9.54  19.92    1.773  0.98( 0.39) 0.40     7.5       1.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     10.57    Tc(MIN.) =    14.54
   EFFECTIVE AREA(ACRES) =     6.59   AREA-AVERAGED Fm(INCH/HR) =  0.40
   AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.42
   TOTAL AREA(ACRES) =      7.48
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =  1870.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     10.00 TO NODE     10.10 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   754.60  DOWNSTREAM(FEET) =   752.10
   FLOW LENGTH(FEET) =   690.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.2 INCHES
```

```
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.69
   ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     10.57
   PIPE TRAVEL TIME(MIN.) =   2.45    Tc(MIN.) =  16.99
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.10 =  2560.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     10.10 TO NODE     10.10 IS CODE =   1

----------------------------------------------------------------------------
-
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

============================================================================
=
   TOTAL NUMBER OF STREAMS =  2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
   TIME OF CONCENTRATION(MIN.) =  16.99
   RAINFALL INTENSITY(INCH/HR) =   1.95
   AREA-AVERAGED Fm(INCH/HR) =  0.40
   AREA-AVERAGED Fp(INCH/HR) =  0.98
   AREA-AVERAGED Ap =  0.42
   EFFECTIVE STREAM AREA(ACRES) =     6.59
   TOTAL STREAM AREA(ACRES) =     7.48
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.57


****************************************************************************
*
   FLOW PROCESS FROM NODE     10.30 TO NODE     10.20 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   900.00
   ELEVATION DATA: UPSTREAM(FEET) =    765.20  DOWNSTREAM(FEET) =    760.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.569
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.980
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        2.52      0.98      0.50    32
16.57
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA RUNOFF(CFS) =      3.39
   TOTAL AREA(ACRES) =      2.52   PEAK FLOW RATE(CFS) =      3.39


****************************************************************************
*
   FLOW PROCESS FROM NODE     10.20 TO NODE     10.10 IS CODE =  31
```

```
----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   753.00  DOWNSTREAM(FEET) =   752.10
   FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.69
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      3.39
   PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =  16.77
   LONGEST FLOWPATH FROM NODE     10.30 TO NODE     10.10 =   970.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     10.10 TO NODE     10.10 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.) =  16.77
   RAINFALL INTENSITY(INCH/HR) =   1.97
   AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.98
   AREA-AVERAGED Ap =  0.50
   EFFECTIVE STREAM AREA(ACRES) =     2.52
   TOTAL STREAM AREA(ACRES) =     2.52
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.39

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     10.57  16.99    1.951  0.98( 0.40) 0.42     6.6       7.00
       1      9.54  22.42    1.652  0.98( 0.39) 0.40     7.5       1.00
       2      3.39  16.77    1.966  0.98( 0.49) 0.50     2.5      10.30

   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     13.93  16.77    1.966  0.98( 0.43) 0.44     9.0      10.30
       2     13.92  16.99    1.951  0.98( 0.43) 0.44     9.1       7.00
       3     12.21  22.42    1.652  0.97( 0.41) 0.42    10.0       1.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     13.93    Tc(MIN.) =    16.77
   EFFECTIVE AREA(ACRES) =     9.03   AREA-AVERAGED Fm(INCH/HR) =  0.43
   AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.44
```

```
   TOTAL AREA(ACRES) =     10.00
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.10 =  2560.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     10.10 TO NODE     12.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   752.10  DOWNSTREAM(FEET) =   751.90
   FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.8 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.46
   ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     13.93
   PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =  17.05
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =  2634.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  17.05
   *  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
   COMMERCIAL                 A        1.39      0.98       0.10    32
   COMMERCIAL                 C        1.26      0.57       0.10    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA AREA(ACRES) =    2.65      SUBAREA RUNOFF(CFS) =    4.46
   EFFECTIVE AREA(ACRES) =     11.68   AREA-AVERAGED Fm(INCH/HR) =  0.35
   AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.36
   TOTAL AREA(ACRES) =     12.65       PEAK FLOW RATE(CFS) =      16.79


****************************************************************************
*
   FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  17.05
   *  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
   PUBLIC PARK                C        0.75      0.57       0.85    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.85
   SUBAREA AREA(ACRES) =    0.75      SUBAREA RUNOFF(CFS) =    0.99
   EFFECTIVE AREA(ACRES) =     12.43   AREA-AVERAGED Fm(INCH/HR) =  0.36
   AREA-AVERAGED Fp(INCH/HR) =  0.91  AREA-AVERAGED Ap =  0.39
   TOTAL AREA(ACRES) =     13.40       PEAK FLOW RATE(CFS) =      17.78


****************************************************************************
*
   FLOW PROCESS FROM NODE     12.00 TO NODE     69.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   751.90  DOWNSTREAM(FEET) =   746.50
   FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.4 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   7.75
   ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     17.78
   PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =  18.23
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE     69.00 =  3184.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     69.00 TO NODE     69.00 IS CODE =  10

----------------------------------------------------------------------------
-
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<

============================================================================
=


****************************************************************************
*
   FLOW PROCESS FROM NODE     40.00 TO NODE     42.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   770.00
   ELEVATION DATA: UPSTREAM(FEET) =    768.80  DOWNSTREAM(FEET) =    760.90

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.878
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.203
```

```
   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.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        4.05      0.98      0.50    32
13.88
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA RUNOFF(CFS) =      6.25
   TOTAL AREA(ACRES) =      4.05   PEAK FLOW RATE(CFS) =      6.25


****************************************************************************
*
   FLOW PROCESS FROM NODE     42.00 TO NODE     42.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  13.88
   *  10 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
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        0.88      0.98      0.50    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    0.88      SUBAREA RUNOFF(CFS) =    1.36
   EFFECTIVE AREA(ACRES) =      4.93   AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =      4.93       PEAK FLOW RATE(CFS) =       7.61


****************************************************************************
*
   FLOW PROCESS FROM NODE     42.00 TO NODE     42.10 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   753.90  DOWNSTREAM(FEET) =   752.80
   FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.8 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.52
   ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      7.61
   PIPE TRAVEL TIME(MIN.) =   0.99    Tc(MIN.) =  14.87
   LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.10 =  1040.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     42.10 TO NODE     42.10 IS CODE =  81
```

```
----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  14.87
   *  10 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
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        1.45      0.98      0.50    32
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        0.17      0.57      0.50    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.93
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    1.62      SUBAREA RUNOFF(CFS) =    2.40
   EFFECTIVE AREA(ACRES) =      6.55   AREA-AVERAGED Fm(INCH/HR) =  0.48
   AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =      6.55       PEAK FLOW RATE(CFS) =       9.61


****************************************************************************
*
   FLOW PROCESS FROM NODE     42.10 TO NODE     42.20 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   752.80  DOWNSTREAM(FEET) =   751.40
   FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.7 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  11.41
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      9.61
   PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  14.92
   LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.20 =  1075.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     42.10 TO NODE     42.10 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) =   2.11
   AREA-AVERAGED Fm(INCH/HR) =  0.48
   AREA-AVERAGED Fp(INCH/HR) =  0.96
```

```
   AREA-AVERAGED Ap =  0.50
   EFFECTIVE STREAM AREA(ACRES) =     6.55
   TOTAL STREAM AREA(ACRES) =     6.55
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.61


****************************************************************************
*
   FLOW PROCESS FROM NODE     43.00 TO NODE     43.10 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   630.00
   ELEVATION DATA: UPSTREAM(FEET) =    770.20  DOWNSTREAM(FEET) =    763.90

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.873
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.304
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        4.00      0.98      0.50    32
12.87
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA RUNOFF(CFS) =      6.54
   TOTAL AREA(ACRES) =      4.00   PEAK FLOW RATE(CFS) =      6.54


****************************************************************************
*
   FLOW PROCESS FROM NODE     43.10 TO NODE     43.20 IS CODE =  62

----------------------------------------------------------------------------
-
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STREET TABLE SECTION #  1 USED)<<<<<

============================================================================
=
   UPSTREAM ELEVATION(FEET) =  763.90  DOWNSTREAM ELEVATION(FEET) =  762.80
   STREET LENGTH(FEET) =   240.00   CURB HEIGHT(INCHES) =  6.0
   STREET HALFWIDTH(FEET) = 18.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
   INSIDE STREET CROSSFALL(DECIMAL) =  0.020
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =
0.0150

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.14
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET) =  0.42
```

```
  HALFSTREET FLOOD WIDTH(FEET) =   13.28
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.83
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.77
STREET FLOW TRAVEL TIME(MIN.) =   2.19   Tc(MIN.) =  15.06
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.097
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"5-7 DWELLINGS/ACRE"       A        0.83      0.98      0.50    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    1.20
EFFECTIVE AREA(ACRES) =      4.83    AREA-AVERAGED Fm(INCH/HR) =  0.49
AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.50
TOTAL AREA(ACRES) =      4.83        PEAK FLOW RATE(CFS) =       7.00

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  13.16
FLOW VELOCITY(FEET/SEC.) =  1.82   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
LONGEST FLOWPATH FROM NODE     43.00 TO NODE     43.20 =   870.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     42.30 TO NODE     42.30 IS CODE =   1

----------------------------------------------------------------------------
-
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
   >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

============================================================================
=
   TOTAL NUMBER OF STREAMS =  2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
   TIME OF CONCENTRATION(MIN.) =  15.06
   RAINFALL INTENSITY(INCH/HR) =   2.10
   AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.98
   AREA-AVERAGED Ap =  0.50
   EFFECTIVE STREAM AREA(ACRES) =     4.83
   TOTAL STREAM AREA(ACRES) =     4.83
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.00

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      9.61  14.92    2.109  0.96( 0.48) 0.50     6.6      40.00
       2      7.00  15.06    2.097  0.98( 0.49) 0.50     4.8      43.00

   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     16.60  14.92    2.109  0.97( 0.48) 0.50    11.3      40.00
       2     16.54  15.06    2.097  0.97( 0.48) 0.50    11.4      43.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     16.60    Tc(MIN.) =    14.92
```

```
   EFFECTIVE AREA(ACRES) =    11.34   AREA-AVERAGED Fm(INCH/HR) =  0.48
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =     11.38
   LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.30 =  1075.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     43.20 TO NODE     43.20 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  14.92
   *  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
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        1.77      0.98      0.50    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    1.77      SUBAREA RUNOFF(CFS) =    2.58
   EFFECTIVE AREA(ACRES) =     13.11   AREA-AVERAGED Fm(INCH/HR) =  0.48
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =     13.15       PEAK FLOW RATE(CFS) =      19.15


****************************************************************************
*
   FLOW PROCESS FROM NODE     43.20 TO NODE     43.30 IS CODE =  62

----------------------------------------------------------------------------
-
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STREET TABLE SECTION #  1 USED)<<<<<

============================================================================
=
   UPSTREAM ELEVATION(FEET) =  762.80  DOWNSTREAM ELEVATION(FEET) =  761.10
   STREET LENGTH(FEET) =   238.00   CURB HEIGHT(INCHES) =  6.0
   STREET HALFWIDTH(FEET) = 18.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
   INSIDE STREET CROSSFALL(DECIMAL) =  0.020
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =
0.0150

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.14
     ***STREET FLOWING FULL***
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
          NOTE: STREET FLOW EXCEEDS TOP OF CURB.
          THE FOLLOWING STREET FLOW RESULTS ARE BASED ON THE ASSUMPTION
          THAT NEGLIBLE FLOW OCCURS OUTSIDE OF THE STREET CHANNEL.
          THAT IS, ALL FLOW ALONG THE PARKWAY, ETC., IS NEGLECTED.
     STREET FLOW DEPTH(FEET) =  0.53
```

```
     HALFSTREET FLOOD WIDTH(FEET) =   18.00
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.80
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.48
   STREET FLOW TRAVEL TIME(MIN.) =   1.42   Tc(MIN.) =  16.34
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.997
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        1.45      0.98      0.50    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    1.45      SUBAREA RUNOFF(CFS) =    1.97
   EFFECTIVE AREA(ACRES) =     14.56    AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =     14.60        PEAK FLOW RATE(CFS) =      19.81

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  18.00
   FLOW VELOCITY(FEET/SEC.) =  2.79   DEPTH*VELOCITY(FT*FT/SEC.) =   1.46
   LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.30 =  1313.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     43.30 TO NODE     42.20 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   754.10  DOWNSTREAM(FEET) =   751.40
   FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.8 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   7.94
   ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     19.81
   PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =  16.91
   LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.20 =  1583.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     42.20 TO NODE     42.30 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   751.40  DOWNSTREAM(FEET) =   750.40
   FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.0 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.70
   ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     19.81
   PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =  17.64
```

```
   LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.30 =  1833.00 FEET.

****************************************************************************
*
   FLOW PROCESS FROM NODE     42.30 TO NODE     42.30 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  17.64
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.908
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        1.09      0.98      0.50    32
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        0.49      0.57      0.50    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    1.58      SUBAREA RUNOFF(CFS) =    2.11
   EFFECTIVE AREA(ACRES) =     16.14   AREA-AVERAGED Fm(INCH/HR) =  0.48
   AREA-AVERAGED Fp(INCH/HR) =  0.96  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =     16.18       PEAK FLOW RATE(CFS) =      20.74


****************************************************************************
*
   FLOW PROCESS FROM NODE     42.30 TO NODE     56.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   750.40  DOWNSTREAM(FEET) =   749.50
   FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.91
   ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     20.74
   PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =  18.23
   LONGEST FLOWPATH FROM NODE     40.00 TO NODE     56.00 =  2043.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  18.23
```

```
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.870
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        3.62      0.57      0.50    69
   PUBLIC PARK                C        1.30      0.57      0.85    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.59
   SUBAREA AREA(ACRES) =    4.92      SUBAREA RUNOFF(CFS) =    6.80
   EFFECTIVE AREA(ACRES) =     21.06   AREA-AVERAGED Fm(INCH/HR) =  0.45
   AREA-AVERAGED Fp(INCH/HR) =  0.85  AREA-AVERAGED Ap =  0.52
   TOTAL AREA(ACRES) =     21.10       PEAK FLOW RATE(CFS) =      27.00


****************************************************************************
*
   FLOW PROCESS FROM NODE     56.00 TO NODE     59.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   749.50  DOWNSTREAM(FEET) =   747.10
   FLOW LENGTH(FEET) =   620.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   6.05
   ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     27.00
   PIPE TRAVEL TIME(MIN.) =   1.71    Tc(MIN.) =  19.94
   LONGEST FLOWPATH FROM NODE     40.00 TO NODE     59.00 =  2663.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =   1

----------------------------------------------------------------------------
-
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

============================================================================
=
   TOTAL NUMBER OF STREAMS =  2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
   TIME OF CONCENTRATION(MIN.) =  19.94
   RAINFALL INTENSITY(INCH/HR) =   1.77
   AREA-AVERAGED Fm(INCH/HR) =  0.45
   AREA-AVERAGED Fp(INCH/HR) =  0.85
   AREA-AVERAGED Ap =  0.52
   EFFECTIVE STREAM AREA(ACRES) =    21.06
   TOTAL STREAM AREA(ACRES) =    21.10
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     27.00


****************************************************************************
*
   FLOW PROCESS FROM NODE     58.00 TO NODE     59.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   620.00
   ELEVATION DATA: UPSTREAM(FEET) =    761.50  DOWNSTREAM(FEET) =    759.60

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.162
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.939
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "3-4 DWELLINGS/ACRE"       C        3.49      0.57      0.60    69
17.16
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
   SUBAREA RUNOFF(CFS) =      5.02
   TOTAL AREA(ACRES) =      3.49   PEAK FLOW RATE(CFS) =      5.02


****************************************************************************
*
   FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 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.) =  17.16
   RAINFALL INTENSITY(INCH/HR) =   1.94
   AREA-AVERAGED Fm(INCH/HR) =  0.34
   AREA-AVERAGED Fp(INCH/HR) =  0.57
   AREA-AVERAGED Ap =  0.60
   EFFECTIVE STREAM AREA(ACRES) =     3.49
   TOTAL STREAM AREA(ACRES) =     3.49
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.02

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     27.00  19.94    1.772  0.85( 0.45) 0.52    21.1      40.00
       1     26.88  20.08    1.765  0.85( 0.45) 0.52    21.1      43.00
       2      5.02  17.16    1.939  0.57( 0.34) 0.60     3.5      58.00

   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     31.18  17.16    1.939  0.80( 0.43) 0.53    21.6      58.00
```

```
       2     31.50  19.94    1.772  0.81( 0.43) 0.53    24.5      40.00
       3     31.36  20.08    1.765  0.81( 0.43) 0.53    24.6      43.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     31.50    Tc(MIN.) =    19.94
   EFFECTIVE AREA(ACRES) =    24.55   AREA-AVERAGED Fm(INCH/HR) =  0.43
   AREA-AVERAGED Fp(INCH/HR) =  0.81  AREA-AVERAGED Ap =  0.53
   TOTAL AREA(ACRES) =     24.59
   LONGEST FLOWPATH FROM NODE     40.00 TO NODE     59.00 =  2663.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     59.00 TO NODE     67.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   747.70  DOWNSTREAM(FEET) =   747.00
   FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.9 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  10.60
   ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     31.50
   PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =  20.01
   LONGEST FLOWPATH FROM NODE     40.00 TO NODE     67.00 =  2708.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     67.00 TO NODE     67.00 IS CODE =  10

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-
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<

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=


****************************************************************************
*
   FLOW PROCESS FROM NODE     60.00 TO NODE     62.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
   ELEVATION DATA: UPSTREAM(FEET) =    764.00  DOWNSTREAM(FEET) =    759.70

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.429
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.778
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
```

```
    DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "3-4 DWELLINGS/ACRE"        C        2.25      0.57       0.60    69
9.43
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
   SUBAREA RUNOFF(CFS) =      4.94
   TOTAL AREA(ACRES) =      2.25   PEAK FLOW RATE(CFS) =      4.94


****************************************************************************
*
   FLOW PROCESS FROM NODE     62.00 TO NODE     66.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   752.70  DOWNSTREAM(FEET) =   752.10
   FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   3.88
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      4.94
   PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =  10.14
   LONGEST FLOWPATH FROM NODE     60.00 TO NODE     66.00 =   465.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     66.00 TO NODE     66.00 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.) =  10.14
   RAINFALL INTENSITY(INCH/HR) =   2.66
   AREA-AVERAGED Fm(INCH/HR) =  0.34
   AREA-AVERAGED Fp(INCH/HR) =  0.57
   AREA-AVERAGED Ap =  0.60
   EFFECTIVE STREAM AREA(ACRES) =     2.25
   TOTAL STREAM AREA(ACRES) =     2.25
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.94


****************************************************************************
*
   FLOW PROCESS FROM NODE     63.00 TO NODE     65.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

================================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   270.00
   ELEVATION DATA: UPSTREAM(FEET) =    763.60  DOWNSTREAM(FEET) =    760.30

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.812
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.893
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        1.38      0.57      0.50    69
8.81
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA RUNOFF(CFS) =      3.24
   TOTAL AREA(ACRES) =      1.38   PEAK FLOW RATE(CFS) =      3.24


****************************************************************************
*
   FLOW PROCESS FROM NODE     65.00 TO NODE     66.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

================================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   753.30  DOWNSTREAM(FEET) =   752.10
   FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.0 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   3.66
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      3.24
   PIPE TRAVEL TIME(MIN.) =   1.37    Tc(MIN.) =  10.18
   LONGEST FLOWPATH FROM NODE     63.00 TO NODE     66.00 =   570.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     66.00 TO NODE     66.00 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.) =  10.18
   RAINFALL INTENSITY(INCH/HR) =   2.65
   AREA-AVERAGED Fm(INCH/HR) =  0.28
   AREA-AVERAGED Fp(INCH/HR) =  0.57
```

```
   AREA-AVERAGED Ap =  0.50
   EFFECTIVE STREAM AREA(ACRES) =     1.38
   TOTAL STREAM AREA(ACRES) =     1.38
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.24

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      4.94  10.14    2.659  0.57( 0.34) 0.60     2.2      60.00
       2      3.24  10.18    2.653  0.57( 0.28) 0.50     1.4      63.00

   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      8.17  10.14    2.659  0.57( 0.32) 0.56     3.6      60.00
       2      8.16  10.18    2.653  0.57( 0.32) 0.56     3.6      63.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      8.17    Tc(MIN.) =    10.14
   EFFECTIVE AREA(ACRES) =     3.62   AREA-AVERAGED Fm(INCH/HR) =  0.32
   AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  0.56
   TOTAL AREA(ACRES) =      3.63
   LONGEST FLOWPATH FROM NODE     63.00 TO NODE     66.00 =   570.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     66.00 TO NODE     67.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   752.10  DOWNSTREAM(FEET) =   747.00
   FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  10.57
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      8.17
   PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =  10.36
   LONGEST FLOWPATH FROM NODE     63.00 TO NODE     67.00 =   710.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     67.00 TO NODE     67.00 IS CODE =  11

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-
   >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<

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=

   ** MAIN STREAM CONFLUENCE DATA **
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```
 STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
 NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
    1      8.17  10.36    2.625  0.57( 0.32) 0.56     3.6      60.00
    2      8.16  10.40    2.619  0.57( 0.32) 0.56     3.6      63.00
LONGEST FLOWPATH FROM NODE     63.00 TO NODE     67.00 =   710.00 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     31.18  17.23    1.934  0.80( 0.43) 0.53    21.6      58.00
    2     31.50  20.01    1.769  0.81( 0.43) 0.53    24.5      40.00
    3     31.36  20.15    1.761  0.81( 0.43) 0.53    24.6      43.00
LONGEST FLOWPATH FROM NODE     40.00 TO NODE     67.00 =  2708.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
 NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
    1     35.52  10.36    2.625  0.75( 0.40) 0.54    16.6      60.00
    2     35.54  10.40    2.619  0.75( 0.40) 0.54    16.7      63.00
    3     36.92  17.23    1.934  0.77( 0.41) 0.54    25.2      58.00
    4     36.64  20.01    1.769  0.78( 0.42) 0.54    28.2      40.00
    5     36.48  20.15    1.761  0.78( 0.42) 0.54    28.2      43.00
  TOTAL AREA(ACRES) =     28.22

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       36.92  Tc(MIN.) =   17.233
EFFECTIVE AREA(ACRES) =     25.25  AREA-AVERAGED Fm(INCH/HR) =  0.41
AREA-AVERAGED Fp(INCH/HR) =  0.77  AREA-AVERAGED Ap =  0.54
TOTAL AREA(ACRES) =     28.22
LONGEST FLOWPATH FROM NODE     40.00 TO NODE     67.00 =  2708.00 FEET.


****************************************************************************
*
FLOW PROCESS FROM NODE     67.00 TO NODE     69.00 IS CODE =  31

----------------------------------------------------------------------------
-
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
ELEVATION DATA: UPSTREAM(FEET) =   747.00  DOWNSTREAM(FEET) =   746.50
FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  36.0 INCH PIPE IS  29.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.05
ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     36.92
PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =  17.65
LONGEST FLOWPATH FROM NODE     40.00 TO NODE     69.00 =  2858.00 FEET.


****************************************************************************
*
FLOW PROCESS FROM NODE     69.00 TO NODE     69.00 IS CODE =  11

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-
>>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

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   ** MAIN STREAM CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     35.52  10.77    2.564  0.75( 0.40) 0.54    16.6      60.00
       2     35.54  10.81    2.559  0.75( 0.40) 0.54    16.7      63.00
       3     36.92  17.65    1.907  0.77( 0.41) 0.54    25.2      58.00
       4     36.64  20.42    1.747  0.78( 0.42) 0.54    28.2      40.00
       5     36.48  20.57    1.740  0.78( 0.42) 0.54    28.2      43.00
   LONGEST FLOWPATH FROM NODE     40.00 TO NODE     69.00 =  2858.00 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     17.78  18.23    1.870  0.91( 0.36) 0.39    12.4      10.30
       2     17.73  18.45    1.857  0.91( 0.36) 0.39    12.5       7.00
       3     15.54  23.92    1.589  0.91( 0.35) 0.38    13.4       1.00
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE     69.00 =  3184.00 FEET.

   ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     50.84  10.77    2.564  0.79( 0.39) 0.49    24.0      60.00
       2     50.88  10.81    2.559  0.79( 0.39) 0.49    24.0      63.00
       3     54.55  17.65    1.907  0.80( 0.39) 0.49    37.3      58.00
       4     54.64  18.23    1.870  0.81( 0.39) 0.49    38.3      10.30
       5     54.57  18.45    1.857  0.81( 0.40) 0.49    38.6       7.00
       6     53.59  20.42    1.747  0.81( 0.40) 0.49    41.0      40.00
       7     53.37  20.57    1.740  0.81( 0.40) 0.49    41.1      43.00
       8     47.87  23.92    1.589  0.81( 0.39) 0.49    41.6       1.00
     TOTAL AREA(ACRES) =     41.62

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =       54.64  Tc(MIN.) =   18.233
   EFFECTIVE AREA(ACRES) =     38.29  AREA-AVERAGED Fm(INCH/HR) =  0.39
   AREA-AVERAGED Fp(INCH/HR) =  0.81  AREA-AVERAGED Ap =  0.49
   TOTAL AREA(ACRES) =     41.62
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE     69.00 =  3184.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     69.00 TO NODE     69.00 IS CODE =  10

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-
   >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<

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****************************************************************************
*
   FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 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) =   950.00
   ELEVATION DATA: UPSTREAM(FEET) =    771.70  DOWNSTREAM(FEET) =    765.00

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.269
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.002
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        3.84      0.57      0.50    69
16.27
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA RUNOFF(CFS) =      5.94
   TOTAL AREA(ACRES) =      3.84   PEAK FLOW RATE(CFS) =      5.94


****************************************************************************
*
   FLOW PROCESS FROM NODE     25.00 TO NODE     25.10 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

================================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   758.00  DOWNSTREAM(FEET) =   756.90
   FLOW LENGTH(FEET) =   245.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.9 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.37
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      5.94
   PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =  17.20
   LONGEST FLOWPATH FROM NODE     24.00 TO NODE     25.10 =  1195.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     25.10 TO NODE     25.10 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

================================================================================
=
   MAINLINE Tc(MIN) =  17.20
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.936
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        3.18      0.57      0.50    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    3.18      SUBAREA RUNOFF(CFS) =    4.73
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   EFFECTIVE AREA(ACRES) =      7.02   AREA-AVERAGED Fm(INCH/HR) =  0.28
   AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =      7.02       PEAK FLOW RATE(CFS) =      10.45


****************************************************************************
*
   FLOW PROCESS FROM NODE     25.10 TO NODE     25.10 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  17.20
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.936
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        0.78      0.98      0.50    32
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        1.00      0.57      0.50    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    1.78      SUBAREA RUNOFF(CFS) =    2.51
   EFFECTIVE AREA(ACRES) =      8.80   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =      8.80       PEAK FLOW RATE(CFS) =      12.95


****************************************************************************
*
   FLOW PROCESS FROM NODE     25.10 TO NODE     29.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   756.90  DOWNSTREAM(FEET) =   755.90
   FLOW LENGTH(FEET) =   295.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.83
   ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     12.95
   PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =  18.22
   LONGEST FLOWPATH FROM NODE     24.00 TO NODE     29.00 =  1490.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 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.) =  18.22
   RAINFALL INTENSITY(INCH/HR) =   1.87
   AREA-AVERAGED Fm(INCH/HR) =  0.30
   AREA-AVERAGED Fp(INCH/HR) =  0.60
   AREA-AVERAGED Ap =  0.50
   EFFECTIVE STREAM AREA(ACRES) =     8.80
   TOTAL STREAM AREA(ACRES) =     8.80
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.95


****************************************************************************
*
   FLOW PROCESS FROM NODE     20.00 TO NODE     22.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   995.00
   ELEVATION DATA: UPSTREAM(FEET) =    773.30  DOWNSTREAM(FEET) =    766.10

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.488
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.986
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        1.67      0.98      0.50    32
16.49
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        0.78      0.57      0.50    69
16.49
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.84
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA RUNOFF(CFS) =      3.45
   TOTAL AREA(ACRES) =      2.45   PEAK FLOW RATE(CFS) =      3.45


****************************************************************************
*
   FLOW PROCESS FROM NODE     22.00 TO NODE     29.00 IS CODE =  62

----------------------------------------------------------------------------
-
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STREET TABLE SECTION #  1 USED)<<<<<

============================================================================
=
   UPSTREAM ELEVATION(FEET) =  766.10  DOWNSTREAM ELEVATION(FEET) =  762.90
   STREET LENGTH(FEET) =   630.00   CURB HEIGHT(INCHES) =  6.0
   STREET HALFWIDTH(FEET) = 18.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
```

```
   INSIDE STREET CROSSFALL(DECIMAL) =  0.020
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =
0.0150

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.10
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET) =  0.46
     HALFSTREET FLOOD WIDTH(FEET) =   15.09
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.07
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.95
   STREET FLOW TRAVEL TIME(MIN.) =   5.08   Tc(MIN.) =  21.57
   *  10 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
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        2.60      0.57      0.50    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    3.29
   EFFECTIVE AREA(ACRES) =      5.05    AREA-AVERAGED Fm(INCH/HR) =  0.35
   AREA-AVERAGED Fp(INCH/HR) =  0.70  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =      5.05        PEAK FLOW RATE(CFS) =       6.09

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  16.22
   FLOW VELOCITY(FEET/SEC.) =  2.16   DEPTH*VELOCITY(FT*FT/SEC.) =   1.04
   LONGEST FLOWPATH FROM NODE     20.00 TO NODE     29.00 =  1625.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 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.) =  21.57
   RAINFALL INTENSITY(INCH/HR) =   1.69
   AREA-AVERAGED Fm(INCH/HR) =  0.35
   AREA-AVERAGED Fp(INCH/HR) =  0.70
   AREA-AVERAGED Ap =  0.50
   EFFECTIVE STREAM AREA(ACRES) =     5.05
   TOTAL STREAM AREA(ACRES) =     5.05
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.09

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     12.95  18.22    1.871  0.60( 0.30) 0.50     8.8      24.00
       2      6.09  21.57    1.690  0.70( 0.35) 0.50     5.0      20.00

   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     18.79  18.22    1.871  0.63( 0.32) 0.50    13.1      24.00
       2     17.55  21.57    1.690  0.64( 0.32) 0.50    13.9      20.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     18.79    Tc(MIN.) =    18.22
   EFFECTIVE AREA(ACRES) =    13.07   AREA-AVERAGED Fm(INCH/HR) =  0.32
   AREA-AVERAGED Fp(INCH/HR) =  0.63  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =     13.85
   LONGEST FLOWPATH FROM NODE     20.00 TO NODE     29.00 =  1625.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     29.00 TO NODE     39.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   755.90  DOWNSTREAM(FEET) =   751.00
   FLOW LENGTH(FEET) =   380.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.5 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   8.75
   ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     18.79
   PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =  18.94
   LONGEST FLOWPATH FROM NODE     20.00 TO NODE     39.00 =  2005.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 IS CODE =  12

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

============================================================================
=


****************************************************************************
*
   FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 IS CODE =  12

----------------------------------------------------------------------------
-
   >>>>>CLEAR MEMORY BANK # 2 <<<<<

============================================================================
=


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

```
*
   FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 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.) =  18.94
   RAINFALL INTENSITY(INCH/HR) =   1.83
   AREA-AVERAGED Fm(INCH/HR) =  0.32
   AREA-AVERAGED Fp(INCH/HR) =  0.63
   AREA-AVERAGED Ap =  0.50
   EFFECTIVE STREAM AREA(ACRES) =    13.07
   TOTAL STREAM AREA(ACRES) =    13.85
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.79


****************************************************************************
*
   FLOW PROCESS FROM NODE     30.00 TO NODE     32.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
   ELEVATION DATA: UPSTREAM(FEET) =    771.70  DOWNSTREAM(FEET) =    763.40

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.074
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.017
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        2.23      0.57      0.50    69
16.07
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA RUNOFF(CFS) =      3.48
   TOTAL AREA(ACRES) =      2.23   PEAK FLOW RATE(CFS) =      3.48


****************************************************************************
*
   FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  16.07
```

```
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.017
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        1.08      0.98      0.50    32
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        0.50      0.57      0.50    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    1.58      SUBAREA RUNOFF(CFS) =    2.27
   EFFECTIVE AREA(ACRES) =      3.81   AREA-AVERAGED Fm(INCH/HR) =  0.34
   AREA-AVERAGED Fp(INCH/HR) =  0.68  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =      3.81       PEAK FLOW RATE(CFS) =       5.75


****************************************************************************
*
   FLOW PROCESS FROM NODE     32.00 TO NODE     32.10 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   756.40  DOWNSTREAM(FEET) =   754.00
   FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.70
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      5.75
   PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =  16.86
   LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.10 =  1270.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     32.10 TO NODE     32.10 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  16.86
   *  10 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
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        2.36      0.98      0.50    32
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        0.89      0.57      0.50    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.86
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    4.47
   EFFECTIVE AREA(ACRES) =      7.06   AREA-AVERAGED Fm(INCH/HR) =  0.38
   AREA-AVERAGED Fp(INCH/HR) =  0.77  AREA-AVERAGED Ap =  0.50
```

```
   TOTAL AREA(ACRES) =      7.06       PEAK FLOW RATE(CFS) =      10.02

****************************************************************************
*
   FLOW PROCESS FROM NODE     32.10 TO NODE     34.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   754.00  DOWNSTREAM(FEET) =   752.60
   FLOW LENGTH(FEET) =   295.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.03
   ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     10.02
   PIPE TRAVEL TIME(MIN.) =   0.98    Tc(MIN.) =  17.84
   LONGEST FLOWPATH FROM NODE     30.00 TO NODE     34.00 =  1565.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  17.84
   *  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
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        1.59      0.98      0.50    32
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        3.88      0.57      0.50    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.68
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    5.47      SUBAREA RUNOFF(CFS) =    7.64
   EFFECTIVE AREA(ACRES) =     12.53   AREA-AVERAGED Fm(INCH/HR) =  0.37
   AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =     12.53       PEAK FLOW RATE(CFS) =      17.25


****************************************************************************
*
   FLOW PROCESS FROM NODE     34.00 TO NODE     39.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
```

```
   ELEVATION DATA: UPSTREAM(FEET) =   752.60  DOWNSTREAM(FEET) =   751.00
   FLOW LENGTH(FEET) =   440.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.0 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.21
   ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     17.25
   PIPE TRAVEL TIME(MIN.) =   1.41    Tc(MIN.) =  19.25
   LONGEST FLOWPATH FROM NODE     30.00 TO NODE     39.00 =  2005.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 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.) =  19.25
   RAINFALL INTENSITY(INCH/HR) =   1.81
   AREA-AVERAGED Fm(INCH/HR) =  0.37
   AREA-AVERAGED Fp(INCH/HR) =  0.73
   AREA-AVERAGED Ap =  0.50
   EFFECTIVE STREAM AREA(ACRES) =    12.53
   TOTAL STREAM AREA(ACRES) =    12.53
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.25

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     18.79  18.94    1.827  0.63( 0.32) 0.50    13.1      24.00
       1     17.55  22.31    1.657  0.64( 0.32) 0.50    13.9      20.00
       2     17.25  19.25    1.810  0.73( 0.37) 0.50    12.5      30.00

   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     35.96  18.94    1.827  0.68( 0.34) 0.50    25.4      24.00
       2     35.92  19.25    1.810  0.68( 0.34) 0.50    25.7      30.00
       3     32.97  22.31    1.657  0.68( 0.34) 0.50    26.4      20.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     35.96    Tc(MIN.) =    18.94
   EFFECTIVE AREA(ACRES) =    25.40   AREA-AVERAGED Fm(INCH/HR) =  0.34
   AREA-AVERAGED Fp(INCH/HR) =  0.68  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =     26.38
   LONGEST FLOWPATH FROM NODE     20.00 TO NODE     39.00 =  2005.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     39.00 TO NODE     69.00 IS CODE =  31

----------------------------------------------------------------------------
```

```
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

================================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   751.00  DOWNSTREAM(FEET) =   746.50
   FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  13.49
   ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     35.96
   PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =  19.15
   LONGEST FLOWPATH FROM NODE     20.00 TO NODE     69.00 =  2175.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     69.00 TO NODE     69.00 IS CODE =  11

----------------------------------------------------------------------------
-
   >>>>>CONFLUENCE MEMORY BANK # 3 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     35.96  19.15    1.815  0.68( 0.34) 0.50    25.4      24.00
       2     35.92  19.46    1.798  0.68( 0.34) 0.50    25.7      30.00
       3     32.97  22.53    1.647  0.68( 0.34) 0.50    26.4      20.00
   LONGEST FLOWPATH FROM NODE     20.00 TO NODE     69.00 =  2175.00 FEET.

   ** MEMORY BANK #  3 CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     50.84  10.77    2.564  0.79( 0.39) 0.49    24.0      60.00
       2     50.88  10.81    2.559  0.79( 0.39) 0.49    24.0      63.00
       3     54.55  17.65    1.907  0.80( 0.39) 0.49    37.3      58.00
       4     54.64  18.23    1.870  0.81( 0.39) 0.49    38.3      10.30
       5     54.57  18.45    1.857  0.81( 0.40) 0.49    38.6       7.00
       6     53.59  20.42    1.747  0.81( 0.40) 0.49    41.0      40.00
       7     53.37  20.57    1.740  0.81( 0.40) 0.49    41.1      43.00
       8     47.87  23.92    1.589  0.81( 0.39) 0.49    41.6       1.00
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE     69.00 =  3184.00 FEET.

   ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     81.34  10.77    2.564  0.75( 0.37) 0.50    38.2      60.00
       2     81.41  10.81    2.559  0.75( 0.37) 0.50    38.4      63.00
       3     89.74  17.65    1.907  0.76( 0.37) 0.49    60.7      58.00
       4     90.14  18.23    1.870  0.76( 0.37) 0.49    62.5      10.30
       5     90.18  18.45    1.857  0.76( 0.37) 0.49    63.1       7.00
       6     90.19  19.15    1.815  0.76( 0.37) 0.49    64.9      24.00
       7     89.99  19.46    1.798  0.76( 0.37) 0.49    65.5      30.00
       8     88.58  20.42    1.747  0.76( 0.38) 0.49    66.9      40.00
       9     88.22  20.57    1.740  0.76( 0.38) 0.49    67.0      43.00
      10     83.12  22.53    1.647  0.76( 0.37) 0.49    67.8      20.00
      11     79.37  23.92    1.589  0.76( 0.37) 0.49    68.0       1.00
```

```
     TOTAL AREA(ACRES) =     68.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =       90.19  Tc(MIN.) =   19.155
   EFFECTIVE AREA(ACRES) =     64.86  AREA-AVERAGED Fm(INCH/HR) =  0.37
   AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =     68.00
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE     69.00 =  3184.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     69.00 TO NODE     70.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   746.50  DOWNSTREAM(FEET) =   744.50
   FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.4 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   8.33
   ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     90.19
   PIPE TRAVEL TIME(MIN.) =   0.98    Tc(MIN.) =  20.13
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE     70.00 =  3674.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE     70.00 TO NODE     70.00 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.) =  20.13
   RAINFALL INTENSITY(INCH/HR) =   1.76
   AREA-AVERAGED Fm(INCH/HR) =  0.37
   AREA-AVERAGED Fp(INCH/HR) =  0.76
   AREA-AVERAGED Ap =  0.49
   EFFECTIVE STREAM AREA(ACRES) =    64.86
   TOTAL STREAM AREA(ACRES) =    68.00
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     90.19


****************************************************************************
*
   FLOW PROCESS FROM NODE     70.10 TO NODE     70.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

```
================================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   928.00
   ELEVATION DATA: UPSTREAM(FEET) =    766.30  DOWNSTREAM(FEET) =    755.80

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.459
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.471
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        0.64      0.57      0.50    69
14.66
   COMMERCIAL                 C        2.98      0.57      0.10    69
11.46
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.17
   SUBAREA RUNOFF(CFS) =      7.74
   TOTAL AREA(ACRES) =      3.62   PEAK FLOW RATE(CFS) =      7.74


****************************************************************************
*
   FLOW PROCESS FROM NODE     70.00 TO NODE     70.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

================================================================================
=
   MAINLINE Tc(MIN) =  11.46
   *  10 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
   PUBLIC PARK                C        1.07      0.57      0.85    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.85
   SUBAREA AREA(ACRES) =    1.07      SUBAREA RUNOFF(CFS) =    1.92
   EFFECTIVE AREA(ACRES) =      4.69   AREA-AVERAGED Fm(INCH/HR) =  0.18
   AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  0.33
   TOTAL AREA(ACRES) =      4.69       PEAK FLOW RATE(CFS) =       9.65


****************************************************************************
*
   FLOW PROCESS FROM NODE     70.00 TO NODE     70.00 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.) =  11.46
   RAINFALL INTENSITY(INCH/HR) =   2.47
```

```
   AREA-AVERAGED Fm(INCH/HR) =  0.18
   AREA-AVERAGED Fp(INCH/HR) =  0.57
   AREA-AVERAGED Ap =  0.33
   EFFECTIVE STREAM AREA(ACRES) =     4.69
   TOTAL STREAM AREA(ACRES) =     4.69
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.65

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     81.34  11.78    2.430  0.75( 0.37) 0.50    38.2      60.00
       1     81.41  11.82    2.425  0.75( 0.37) 0.50    38.4      63.00
       1     89.74  18.63    1.846  0.76( 0.37) 0.49    60.7      58.00
       1     90.14  19.21    1.812  0.76( 0.37) 0.49    62.5      10.30
       1     90.18  19.43    1.800  0.76( 0.37) 0.49    63.1       7.00
       1     90.19  20.13    1.762  0.76( 0.37) 0.49    64.9      24.00
       1     89.99  20.44    1.746  0.76( 0.37) 0.49    65.5      30.00
       1     88.58  21.43    1.697  0.76( 0.38) 0.49    66.9      40.00
       1     88.22  21.57    1.690  0.76( 0.38) 0.49    67.0      43.00
       1     83.12  23.54    1.604  0.76( 0.37) 0.49    67.8      20.00
       1     79.37  24.93    1.550  0.76( 0.37) 0.49    68.0       1.00
       2      9.65  11.46    2.471  0.57( 0.18) 0.33     4.7      70.10

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

   ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     90.33  11.46    2.471  0.73( 0.35) 0.48    41.9      70.10
       2     90.82  11.78    2.430  0.73( 0.35) 0.48    42.9      60.00
       3     90.87  11.82    2.425  0.73( 0.35) 0.48    43.1      63.00
       4     96.75  18.63    1.846  0.75( 0.36) 0.48    65.4      58.00
       5     97.01  19.21    1.812  0.75( 0.36) 0.48    67.2      10.30
       6     97.00  19.43    1.800  0.75( 0.36) 0.48    67.8       7.00
       7     96.84  20.13    1.762  0.75( 0.36) 0.48    69.5      24.00
       8     96.58  20.44    1.746  0.75( 0.36) 0.48    70.2      30.00
       9     94.97  21.43    1.697  0.75( 0.36) 0.48    71.6      40.00
      10     94.58  21.57    1.690  0.75( 0.36) 0.48    71.7      43.00
      11     89.12  23.54    1.604  0.75( 0.36) 0.48    72.5      20.00
      12     85.13  24.93    1.550  0.75( 0.36) 0.48    72.7       1.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     97.01    Tc(MIN.) =    19.21
   EFFECTIVE AREA(ACRES) =    67.16   AREA-AVERAGED Fm(INCH/HR) =  0.36
   AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.48
   TOTAL AREA(ACRES) =     72.69
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE     70.00 =  3674.00 FEET.


+----------------------------------------------------------------------------
+
 | South-West Area
|
 |
|
 |
|

+----------------------------------------------------------------------------
+
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****************************************************************************
*
   FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   960.00
   ELEVATION DATA: UPSTREAM(FEET) =    764.00  DOWNSTREAM(FEET) =    755.70

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.613
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.977
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "3-4 DWELLINGS/ACRE"       A        2.32      0.98      0.60    32
16.61
   RESIDENTIAL
   "3-4 DWELLINGS/ACRE"       C        5.06      0.57      0.60    69
16.61
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.69
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
   SUBAREA RUNOFF(CFS) =     10.37
   TOTAL AREA(ACRES) =      7.38   PEAK FLOW RATE(CFS) =     10.37


****************************************************************************
*
   FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  16.61
   *  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
   RESIDENTIAL
   "3-4 DWELLINGS/ACRE"       A        2.14      0.98      0.60    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
   SUBAREA AREA(ACRES) =    2.14      SUBAREA RUNOFF(CFS) =    2.68
   EFFECTIVE AREA(ACRES) =      9.52   AREA-AVERAGED Fm(INCH/HR) =  0.45
   AREA-AVERAGED Fp(INCH/HR) =  0.76  AREA-AVERAGED Ap =  0.60
   TOTAL AREA(ACRES) =      9.52       PEAK FLOW RATE(CFS) =      13.05


****************************************************************************
*
   FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   748.70  DOWNSTREAM(FEET) =   746.80
   FLOW LENGTH(FEET) =   480.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.5 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.02
   ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     13.05
   PIPE TRAVEL TIME(MIN.) =   1.59    Tc(MIN.) =  18.21
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =  1440.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  18.21
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.872
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        1.44      0.98      0.50    32
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        1.82      0.57      0.50    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    3.26      SUBAREA RUNOFF(CFS) =    4.40
   EFFECTIVE AREA(ACRES) =     12.78   AREA-AVERAGED Fm(INCH/HR) =  0.43
   AREA-AVERAGED Fp(INCH/HR) =  0.76  AREA-AVERAGED Ap =  0.57
   TOTAL AREA(ACRES) =     12.78       PEAK FLOW RATE(CFS) =      16.54


****************************************************************************
*
   FLOW PROCESS FROM NODE    103.00 TO NODE    109.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   746.80  DOWNSTREAM(FEET) =   745.90
   FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.6 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.36
   ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     16.54
```

```
   PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =  18.92
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =  1670.00 FEET.

****************************************************************************
*
   FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  18.92
   *  10 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
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        1.81      0.98       0.50    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    2.18
   EFFECTIVE AREA(ACRES) =     14.59   AREA-AVERAGED Fm(INCH/HR) =  0.44
   AREA-AVERAGED Fp(INCH/HR) =  0.78  AREA-AVERAGED Ap =  0.57
   TOTAL AREA(ACRES) =     14.59       PEAK FLOW RATE(CFS) =      18.23


****************************************************************************
*
   FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 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.) =  18.92
   RAINFALL INTENSITY(INCH/HR) =   1.83
   AREA-AVERAGED Fm(INCH/HR) =  0.44
   AREA-AVERAGED Fp(INCH/HR) =  0.78
   AREA-AVERAGED Ap =  0.57
   EFFECTIVE STREAM AREA(ACRES) =    14.59
   TOTAL STREAM AREA(ACRES) =    14.59
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.23


****************************************************************************
*
   FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

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=
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```
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   710.00
   ELEVATION DATA: UPSTREAM(FEET) =    761.80  DOWNSTREAM(FEET) =    756.60

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.221
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.084
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "3-4 DWELLINGS/ACRE"       C        2.45      0.57      0.60    69
15.22
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
   SUBAREA RUNOFF(CFS) =      3.85
   TOTAL AREA(ACRES) =      2.45   PEAK FLOW RATE(CFS) =      3.85


****************************************************************************
*
   FLOW PROCESS FROM NODE    105.00 TO NODE    109.00 IS CODE =  62

----------------------------------------------------------------------------
-
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STREET TABLE SECTION #  1 USED)<<<<<

============================================================================
=
   UPSTREAM ELEVATION(FEET) =  756.60  DOWNSTREAM ELEVATION(FEET) =  753.00
   STREET LENGTH(FEET) =   600.00   CURB HEIGHT(INCHES) =  6.0
   STREET HALFWIDTH(FEET) = 18.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
   INSIDE STREET CROSSFALL(DECIMAL) =  0.020
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =
0.0150

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.11
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET) =  0.39
     HALFSTREET FLOOD WIDTH(FEET) =   11.72
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.96
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.77
   STREET FLOW TRAVEL TIME(MIN.) =   5.11   Tc(MIN.) =  20.33
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.752
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "3-4 DWELLINGS/ACRE"       A        2.55      0.98      0.60    32
   RESIDENTIAL
   "3-4 DWELLINGS/ACRE"       C        1.44      0.57      0.60    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.83
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
   SUBAREA AREA(ACRES) =    3.99      SUBAREA RUNOFF(CFS) =    4.51
   EFFECTIVE AREA(ACRES) =      6.44    AREA-AVERAGED Fm(INCH/HR) =  0.44
   AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.60
```

```
   TOTAL AREA(ACRES) =      6.44        PEAK FLOW RATE(CFS) =       7.62

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  12.91
   FLOW VELOCITY(FEET/SEC.) =  2.05   DEPTH*VELOCITY(FT*FT/SEC.) =   0.86
   LONGEST FLOWPATH FROM NODE    104.00 TO NODE    109.00 =  1310.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =   1

----------------------------------------------------------------------------
-
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
   >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

============================================================================
=
   TOTAL NUMBER OF STREAMS =  2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
   TIME OF CONCENTRATION(MIN.) =  20.33
   RAINFALL INTENSITY(INCH/HR) =   1.75
   AREA-AVERAGED Fm(INCH/HR) =  0.44
   AREA-AVERAGED Fp(INCH/HR) =  0.73
   AREA-AVERAGED Ap =  0.60
   EFFECTIVE STREAM AREA(ACRES) =     6.44
   TOTAL STREAM AREA(ACRES) =     6.44
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.62

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     18.23  18.92    1.829  0.78( 0.44) 0.57    14.6     100.00
       2      7.62  20.33    1.752  0.73( 0.44) 0.60     6.4     104.00

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

   ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     25.74  18.92    1.829  0.76( 0.44) 0.58    20.6     100.00
       2     24.84  20.33    1.752  0.76( 0.44) 0.58    21.0     104.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     25.74    Tc(MIN.) =    18.92
   EFFECTIVE AREA(ACRES) =    20.58   AREA-AVERAGED Fm(INCH/HR) =  0.44
   AREA-AVERAGED Fp(INCH/HR) =  0.76  AREA-AVERAGED Ap =  0.58
   TOTAL AREA(ACRES) =     21.03
   LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =  1670.00 FEET.


+----------------------------------------------------------------------------
+
 | South-East Area
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+----------------------------------------------------------------------------
+


****************************************************************************
*
   FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   810.00
   ELEVATION DATA: UPSTREAM(FEET) =    764.00  DOWNSTREAM(FEET) =    757.70

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.968
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.105
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        4.60      0.98      0.50    32
14.97
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        4.60      0.57      0.50    69
14.97
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.77
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA RUNOFF(CFS) =     14.24
   TOTAL AREA(ACRES) =      9.20   PEAK FLOW RATE(CFS) =     14.24


****************************************************************************
*
   FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   750.70  DOWNSTREAM(FEET) =   748.70
   FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   6.84
   ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     14.24
   PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =  15.58
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =  1060.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
```

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----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  15.58
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.055
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "3-4 DWELLINGS/ACRE"       A        1.38      0.98      0.60    32
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        0.70      0.57      0.50    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.57
   SUBAREA AREA(ACRES) =    2.08      SUBAREA RUNOFF(CFS) =    2.94
   EFFECTIVE AREA(ACRES) =     11.28   AREA-AVERAGED Fm(INCH/HR) =  0.40
   AREA-AVERAGED Fp(INCH/HR) =  0.79  AREA-AVERAGED Ap =  0.51
   TOTAL AREA(ACRES) =     11.28       PEAK FLOW RATE(CFS) =      16.77


****************************************************************************
*
   FLOW PROCESS FROM NODE    203.00 TO NODE    207.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   748.70  DOWNSTREAM(FEET) =   747.80
   FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.1 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.58
   ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     16.77
   PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =  16.21
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.00 =  1270.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  16.21
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.007
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        2.64      0.98      0.50    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
```

```
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    2.64      SUBAREA RUNOFF(CFS) =    3.61
   EFFECTIVE AREA(ACRES) =     13.92   AREA-AVERAGED Fm(INCH/HR) =  0.42
   AREA-AVERAGED Fp(INCH/HR) =  0.82  AREA-AVERAGED Ap =  0.51
   TOTAL AREA(ACRES) =     13.92       PEAK FLOW RATE(CFS) =      19.89


****************************************************************************
*
   FLOW PROCESS FROM NODE    207.00 TO NODE    207.10 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   747.80  DOWNSTREAM(FEET) =   745.90
   FLOW LENGTH(FEET) =   320.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   6.57
   ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     19.89
   PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =  17.02
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.10 =  1590.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    207.10 TO NODE    207.10 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.) =  17.02
   RAINFALL INTENSITY(INCH/HR) =   1.95
   AREA-AVERAGED Fm(INCH/HR) =  0.42
   AREA-AVERAGED Fp(INCH/HR) =  0.82
   AREA-AVERAGED Ap =  0.51
   EFFECTIVE STREAM AREA(ACRES) =    13.92
   TOTAL STREAM AREA(ACRES) =    13.92
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.89


****************************************************************************
*
   FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   900.00
```

```
   ELEVATION DATA: UPSTREAM(FEET) =    761.20  DOWNSTREAM(FEET) =    754.20

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.613
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.052
   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.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        2.70      0.98      0.50    32
15.61
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        0.70      0.57      0.50    69
15.61
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.89
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA RUNOFF(CFS) =      4.92
   TOTAL AREA(ACRES) =      3.40   PEAK FLOW RATE(CFS) =      4.92


****************************************************************************
*
   FLOW PROCESS FROM NODE    204.10 TO NODE    207.10 IS CODE =  62

----------------------------------------------------------------------------
-
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STREET TABLE SECTION #  1 USED)<<<<<

============================================================================
=
   UPSTREAM ELEVATION(FEET) =  754.20  DOWNSTREAM ELEVATION(FEET) =  752.90
   STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
   STREET HALFWIDTH(FEET) = 18.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
   INSIDE STREET CROSSFALL(DECIMAL) =  0.020
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =
0.0150

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.53
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET) =  0.38
     HALFSTREET FLOOD WIDTH(FEET) =   11.03
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.97
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
   STREET FLOW TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =  17.31
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.929
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        0.83      0.57      0.50    69
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    1.23
   EFFECTIVE AREA(ACRES) =      4.23    AREA-AVERAGED Fm(INCH/HR) =  0.41
   AREA-AVERAGED Fp(INCH/HR) =  0.83  AREA-AVERAGED Ap =  0.50
```

```
   TOTAL AREA(ACRES) =      4.23        PEAK FLOW RATE(CFS) =       5.77

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  11.22
   FLOW VELOCITY(FEET/SEC.) =  1.99   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
   LONGEST FLOWPATH FROM NODE    204.00 TO NODE    207.10 =  1100.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    207.10 TO NODE    207.10 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.) =  17.31
   RAINFALL INTENSITY(INCH/HR) =   1.93
   AREA-AVERAGED Fm(INCH/HR) =  0.41
   AREA-AVERAGED Fp(INCH/HR) =  0.83
   AREA-AVERAGED Ap =  0.50
   EFFECTIVE STREAM AREA(ACRES) =     4.23
   TOTAL STREAM AREA(ACRES) =     4.23
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.77

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     19.89  17.02    1.949  0.82( 0.42) 0.51    13.9     200.00
       2      5.77  17.31    1.929  0.83( 0.41) 0.50     4.2     204.00

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

   ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     25.64  17.02    1.949  0.82( 0.42) 0.51    18.1     200.00
       2     25.40  17.31    1.929  0.82( 0.42) 0.51    18.1     204.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     25.64    Tc(MIN.) =    17.02
   EFFECTIVE AREA(ACRES) =    18.08   AREA-AVERAGED Fm(INCH/HR) =  0.42
   AREA-AVERAGED Fp(INCH/HR) =  0.82  AREA-AVERAGED Ap =  0.51
   TOTAL AREA(ACRES) =     18.15
   LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.10 =  1590.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    207.10 TO NODE    220.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

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```
=
   MAINLINE Tc(MIN) =  17.02
   *  10 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
   RESIDENTIAL
   "3-4 DWELLINGS/ACRE"       A        3.79      0.98      0.60    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
   SUBAREA AREA(ACRES) =    3.79      SUBAREA RUNOFF(CFS) =    4.65
   EFFECTIVE AREA(ACRES) =     21.87   AREA-AVERAGED Fm(INCH/HR) =  0.45
   AREA-AVERAGED Fp(INCH/HR) =  0.85  AREA-AVERAGED Ap =  0.52
   TOTAL AREA(ACRES) =     21.94       PEAK FLOW RATE(CFS) =      29.56


****************************************************************************
*
   FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 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.) =  17.02
   RAINFALL INTENSITY(INCH/HR) =   1.95
   AREA-AVERAGED Fm(INCH/HR) =  0.45
   AREA-AVERAGED Fp(INCH/HR) =  0.85
   AREA-AVERAGED Ap =  0.52
   EFFECTIVE STREAM AREA(ACRES) =    21.87
   TOTAL STREAM AREA(ACRES) =    21.94
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.56


****************************************************************************
*
   FLOW PROCESS FROM NODE    217.00 TO NODE    218.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   995.00
   ELEVATION DATA: UPSTREAM(FEET) =    764.30  DOWNSTREAM(FEET) =    756.50

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.226
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.005
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        1.71      0.98      0.50    32
16.23
```

```
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       C        1.30      0.57      0.50    69
16.23
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA RUNOFF(CFS) =      4.35
   TOTAL AREA(ACRES) =      3.01   PEAK FLOW RATE(CFS) =      4.35


****************************************************************************
*
   FLOW PROCESS FROM NODE    218.00 TO NODE    220.00 IS CODE =  62

----------------------------------------------------------------------------
-
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STREET TABLE SECTION #  1 USED)<<<<<

============================================================================
=
   UPSTREAM ELEVATION(FEET) =  756.50  DOWNSTREAM ELEVATION(FEET) =  750.70
   STREET LENGTH(FEET) =   835.00   CURB HEIGHT(INCHES) =  6.0
   STREET HALFWIDTH(FEET) = 18.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
   INSIDE STREET CROSSFALL(DECIMAL) =  0.020
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =
0.0150

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.18
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET) =  0.40
     HALFSTREET FLOOD WIDTH(FEET) =   12.16
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.15
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
   STREET FLOW TRAVEL TIME(MIN.) =   6.46   Tc(MIN.) =  22.69
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.640
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "3-4 DWELLINGS/ACRE"       A        5.90      0.98      0.60    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
   SUBAREA AREA(ACRES) =    5.90      SUBAREA RUNOFF(CFS) =    5.60
   EFFECTIVE AREA(ACRES) =      8.91    AREA-AVERAGED Fm(INCH/HR) =  0.52
   AREA-AVERAGED Fp(INCH/HR) =  0.92  AREA-AVERAGED Ap =  0.57
   TOTAL AREA(ACRES) =      8.91        PEAK FLOW RATE(CFS) =       8.96

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  13.41
   FLOW VELOCITY(FEET/SEC.) =  2.26   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
   LONGEST FLOWPATH FROM NODE    217.00 TO NODE    220.00 =  1830.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 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.) =  22.69
   RAINFALL INTENSITY(INCH/HR) =   1.64
   AREA-AVERAGED Fm(INCH/HR) =  0.52
   AREA-AVERAGED Fp(INCH/HR) =  0.92
   AREA-AVERAGED Ap =  0.57
   EFFECTIVE STREAM AREA(ACRES) =     8.91
   TOTAL STREAM AREA(ACRES) =     8.91
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.96

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     29.56  17.02    1.949  0.85( 0.45) 0.52    21.9     200.00
       1     29.27  17.31    1.929  0.85( 0.45) 0.52    21.9     204.00
       2      8.96  22.69    1.640  0.92( 0.52) 0.57     8.9     217.00

   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     38.15  17.02    1.949  0.87( 0.46) 0.53    28.6     200.00
       2     37.88  17.31    1.929  0.87( 0.46) 0.53    28.7     204.00
       3     32.53  22.69    1.640  0.87( 0.47) 0.54    30.8     217.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     38.15    Tc(MIN.) =    17.02
   EFFECTIVE AREA(ACRES) =    28.55   AREA-AVERAGED Fm(INCH/HR) =  0.46
   AREA-AVERAGED Fp(INCH/HR) =  0.87  AREA-AVERAGED Ap =  0.53
   TOTAL AREA(ACRES) =     30.85
   LONGEST FLOWPATH FROM NODE    217.00 TO NODE    220.00 =  1830.00 FEET.


+----------------------------------------------------------------------
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 | North-East Area
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**********************************************************************
*
   FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21

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-
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```
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

================================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   830.00
   ELEVATION DATA: UPSTREAM(FEET) =    774.10  DOWNSTREAM(FEET) =    767.10

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.872
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.113
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        3.73      0.98      0.50    32
14.87
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA RUNOFF(CFS) =      5.46
   TOTAL AREA(ACRES) =      3.73   PEAK FLOW RATE(CFS) =      5.46


****************************************************************************
*
   FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  62

----------------------------------------------------------------------------
-
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STREET TABLE SECTION #  1 USED)<<<<<

================================================================================
=
   UPSTREAM ELEVATION(FEET) =  767.10  DOWNSTREAM ELEVATION(FEET) =  763.50
   STREET LENGTH(FEET) =   600.00   CURB HEIGHT(INCHES) =  6.0
   STREET HALFWIDTH(FEET) = 18.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
   INSIDE STREET CROSSFALL(DECIMAL) =  0.020
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =
0.0150

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.98
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET) =  0.41
     HALFSTREET FLOOD WIDTH(FEET) =   12.41
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.02
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.82
   STREET FLOW TRAVEL TIME(MIN.) =   4.95   Tc(MIN.) =  19.82
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.778
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        2.62      0.98      0.50    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
```

```
   SUBAREA AREA(ACRES) =    2.62      SUBAREA RUNOFF(CFS) =    3.04
   EFFECTIVE AREA(ACRES) =      6.35    AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =      6.35        PEAK FLOW RATE(CFS) =       7.38

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  12.72
   FLOW VELOCITY(FEET/SEC.) =  2.04   DEPTH*VELOCITY(FT*FT/SEC.) =   0.84
   LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =  1430.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  19.82
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.778
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        3.75      0.98      0.50    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    3.75      SUBAREA RUNOFF(CFS) =    4.36
   EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =     10.10       PEAK FLOW RATE(CFS) =      11.73


****************************************************************************
*
   FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  19.82
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.778
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        0.93      0.98      0.50    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    1.08
   EFFECTIVE AREA(ACRES) =     11.03   AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =     11.03       PEAK FLOW RATE(CFS) =      12.81


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*
   FLOW PROCESS FROM NODE    310.00 TO NODE    313.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   756.50  DOWNSTREAM(FEET) =   755.20
   FLOW LENGTH(FEET) =   330.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.00
   ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     12.81
   PIPE TRAVEL TIME(MIN.) =   1.10    Tc(MIN.) =  20.92
   LONGEST FLOWPATH FROM NODE    308.00 TO NODE    313.00 =  1760.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    313.00 TO NODE    313.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  20.92
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.722
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        3.87      0.98       0.50    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    3.87      SUBAREA RUNOFF(CFS) =    4.30
   EFFECTIVE AREA(ACRES) =     14.90   AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =     14.90       PEAK FLOW RATE(CFS) =      16.55


****************************************************************************
*
   FLOW PROCESS FROM NODE    313.00 TO NODE    317.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   755.20  DOWNSTREAM(FEET) =   754.40
   FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.4 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   4.89
   ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     16.55
```

```
   PIPE TRAVEL TIME(MIN.) =   0.85    Tc(MIN.) =  21.78
   LONGEST FLOWPATH FROM NODE    308.00 TO NODE    317.00 =  2010.00 FEET.


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*
   FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =   1

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-
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

============================================================================
=
   TOTAL NUMBER OF STREAMS =  2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
   TIME OF CONCENTRATION(MIN.) =  21.78
   RAINFALL INTENSITY(INCH/HR) =   1.68
   AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.97
   AREA-AVERAGED Ap =  0.50
   EFFECTIVE STREAM AREA(ACRES) =    14.90
   TOTAL STREAM AREA(ACRES) =    14.90
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.55


****************************************************************************
*
   FLOW PROCESS FROM NODE    315.00 TO NODE    316.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   665.00
   ELEVATION DATA: UPSTREAM(FEET) =    774.10  DOWNSTREAM(FEET) =    767.70

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.256
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        2.32      0.98      0.50    32
13.26
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA RUNOFF(CFS) =      3.71
   TOTAL AREA(ACRES) =      2.32   PEAK FLOW RATE(CFS) =      3.71


****************************************************************************
*
   FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  62

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```
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STREET TABLE SECTION #  1 USED)<<<<<

================================================================================
=
   UPSTREAM ELEVATION(FEET) =  767.70  DOWNSTREAM ELEVATION(FEET) =  763.70
   STREET LENGTH(FEET) =   550.00   CURB HEIGHT(INCHES) =  6.0
   STREET HALFWIDTH(FEET) = 18.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
   INSIDE STREET CROSSFALL(DECIMAL) =  0.020
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =
0.0150

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.86
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET) =  0.40
     HALFSTREET FLOOD WIDTH(FEET) =   11.84
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.16
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.85
   STREET FLOW TRAVEL TIME(MIN.) =   4.25   Tc(MIN.) =  17.51
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.916
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        4.88      0.98      0.50    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    4.88      SUBAREA RUNOFF(CFS) =    6.27
   EFFECTIVE AREA(ACRES) =      7.20    AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =      7.20        PEAK FLOW RATE(CFS) =       9.26

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  13.47
   FLOW VELOCITY(FEET/SEC.) =  2.31   DEPTH*VELOCITY(FT*FT/SEC.) =   0.99
   LONGEST FLOWPATH FROM NODE    315.00 TO NODE    317.00 =  1215.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 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.) =  17.51
   RAINFALL INTENSITY(INCH/HR) =   1.92
   AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.98
   AREA-AVERAGED Ap =  0.50
   EFFECTIVE STREAM AREA(ACRES) =     7.20
```

```
   TOTAL STREAM AREA(ACRES) =     7.20
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.26

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     16.55  21.78    1.681  0.97( 0.49) 0.50    14.9     308.00
       2      9.26  17.51    1.916  0.98( 0.49) 0.50     7.2     315.00

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

   ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     25.18  17.51    1.916  0.97( 0.49) 0.50    19.2     315.00
       2     24.28  21.78    1.681  0.97( 0.49) 0.50    22.1     308.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     25.18    Tc(MIN.) =    17.51
   EFFECTIVE AREA(ACRES) =    19.18   AREA-AVERAGED Fm(INCH/HR) =  0.49
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.50
   TOTAL AREA(ACRES) =     22.10
   LONGEST FLOWPATH FROM NODE    308.00 TO NODE    317.00 =  2010.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    317.00 TO NODE    325.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   763.70  DOWNSTREAM(FEET) =   752.60
   FLOW LENGTH(FEET) =   445.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  12.07
   ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     25.18
   PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =  18.12
   LONGEST FLOWPATH FROM NODE    308.00 TO NODE    325.00 =  2455.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 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.) =  18.12
   RAINFALL INTENSITY(INCH/HR) =   1.88
   AREA-AVERAGED Fm(INCH/HR) =  0.49
```

```
   AREA-AVERAGED Fp(INCH/HR) =  0.97
   AREA-AVERAGED Ap =  0.50
   EFFECTIVE STREAM AREA(ACRES) =    19.18
   TOTAL STREAM AREA(ACRES) =    22.10
   PEAK FLOW RATE(CFS) AT CONFLUENCE =     25.18


****************************************************************************
*
   FLOW PROCESS FROM NODE    320.00 TO NODE    321.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   650.00
   ELEVATION DATA: UPSTREAM(FEET) =    783.80  DOWNSTREAM(FEET) =    778.90

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.779
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.563
   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.)
   COMMERCIAL                 A        1.14      0.98      0.10    32
10.78
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA RUNOFF(CFS) =      2.53
   TOTAL AREA(ACRES) =      1.14   PEAK FLOW RATE(CFS) =      2.53


****************************************************************************
*
   FLOW PROCESS FROM NODE    321.00 TO NODE    323.00 IS CODE =  62

----------------------------------------------------------------------------
-
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STREET TABLE SECTION #  2 USED)<<<<<

============================================================================
=
   UPSTREAM ELEVATION(FEET) =  778.90  DOWNSTREAM ELEVATION(FEET) =  778.70
   STREET LENGTH(FEET) =   395.00   CURB HEIGHT(INCHES) =  8.0
   STREET HALFWIDTH(FEET) = 32.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  27.00
   INSIDE STREET CROSSFALL(DECIMAL) =  0.020
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =
0.0150

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.48
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET) =  0.47
```

```
     HALFSTREET FLOOD WIDTH(FEET) =   15.56
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.67
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.31
   STREET FLOW TRAVEL TIME(MIN.) =   9.88   Tc(MIN.) =  20.66
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.735
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   COMMERCIAL                 A        1.28      0.98      0.10    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA AREA(ACRES) =    1.28      SUBAREA RUNOFF(CFS) =    1.89
   EFFECTIVE AREA(ACRES) =      2.42    AREA-AVERAGED Fm(INCH/HR) =  0.10
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
   TOTAL AREA(ACRES) =      2.42        PEAK FLOW RATE(CFS) =       3.57

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  15.74
   FLOW VELOCITY(FEET/SEC.) =  0.67   DEPTH*VELOCITY(FT*FT/SEC.) =   0.32
   LONGEST FLOWPATH FROM NODE    320.00 TO NODE    323.00 =  1045.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    323.00 TO NODE    325.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   766.70  DOWNSTREAM(FEET) =   752.60
   FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.1 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  17.39
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =      3.57
   PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  20.71
   LONGEST FLOWPATH FROM NODE    320.00 TO NODE    325.00 =  1095.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 IS CODE =   1

----------------------------------------------------------------------------
-
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
   >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

============================================================================
=
   TOTAL NUMBER OF STREAMS =  2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
   TIME OF CONCENTRATION(MIN.) =  20.71
   RAINFALL INTENSITY(INCH/HR) =   1.73
   AREA-AVERAGED Fm(INCH/HR) =  0.10
   AREA-AVERAGED Fp(INCH/HR) =  0.97
   AREA-AVERAGED Ap =  0.10
```

```
   EFFECTIVE STREAM AREA(ACRES) =     2.42
   TOTAL STREAM AREA(ACRES) =     2.42
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.57

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1     25.18  18.12    1.877  0.97( 0.49) 0.50    19.2     315.00
       1     24.28  22.42    1.652  0.97( 0.49) 0.50    22.1     308.00
       2      3.57  20.71    1.732  0.97( 0.10) 0.10     2.4     320.00

   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     28.58  18.12    1.877  0.98( 0.45) 0.46    21.3     315.00
       2     28.21  20.71    1.732  0.97( 0.45) 0.46    23.4     320.00
       3     27.67  22.42    1.652  0.97( 0.45) 0.46    24.5     308.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =     28.58    Tc(MIN.) =    18.12
   EFFECTIVE AREA(ACRES) =    21.30   AREA-AVERAGED Fm(INCH/HR) =  0.45
   AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.46
   TOTAL AREA(ACRES) =     24.52
   LONGEST FLOWPATH FROM NODE    308.00 TO NODE    325.00 =  2455.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    325.00 TO NODE    326.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   752.60  DOWNSTREAM(FEET) =   326.00
   FLOW LENGTH(FEET) =   640.00   MANNING'S N =  0.013
   ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
   DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.3 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =  42.84
   ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     28.58
   PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =  18.37
   LONGEST FLOWPATH FROM NODE    308.00 TO NODE    326.00 =  3095.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  18.37
```

```
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.861
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A       13.00      0.98      0.50    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =   13.00      SUBAREA RUNOFF(CFS) =   16.08
   EFFECTIVE AREA(ACRES) =     34.30   AREA-AVERAGED Fm(INCH/HR) =  0.46
   AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.48
   TOTAL AREA(ACRES) =     37.52       PEAK FLOW RATE(CFS) =      43.15


****************************************************************************
*
   FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  18.37
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.861
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   COMMERCIAL                 A        2.00      0.98      0.10    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    3.18
   EFFECTIVE AREA(ACRES) =     36.30   AREA-AVERAGED Fm(INCH/HR) =  0.44
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.45
   TOTAL AREA(ACRES) =     39.52       PEAK FLOW RATE(CFS) =      46.33


****************************************************************************
*
   FLOW PROCESS FROM NODE    326.00 TO NODE    327.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   750.00  DOWNSTREAM(FEET) =   749.90
   FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.7 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.38
   ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     46.33
   PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =  18.53
   LONGEST FLOWPATH FROM NODE    308.00 TO NODE    327.00 =  3145.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    327.00 TO NODE    327.00 IS CODE =  81
```

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----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  18.53
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.852
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   COMMERCIAL                 A        1.00      0.98       0.10    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    1.58
   EFFECTIVE AREA(ACRES) =     37.30   AREA-AVERAGED Fm(INCH/HR) =  0.43
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.45
   TOTAL AREA(ACRES) =     40.52       PEAK FLOW RATE(CFS) =      47.60


****************************************************************************
*
   FLOW PROCESS FROM NODE    327.00 TO NODE    328.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   749.90  DOWNSTREAM(FEET) =   746.40
   FLOW LENGTH(FEET) =   860.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.7 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   7.03
   ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     47.60
   PIPE TRAVEL TIME(MIN.) =   2.04    Tc(MIN.) =  20.57
   LONGEST FLOWPATH FROM NODE    308.00 TO NODE    328.00 =  4005.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    328.00 TO NODE    328.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  20.57
   *  10 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
   SCHOOL                     A        9.70      0.98       0.60    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
   SUBAREA AREA(ACRES) =    9.70      SUBAREA RUNOFF(CFS) =   10.08
   EFFECTIVE AREA(ACRES) =     47.00   AREA-AVERAGED Fm(INCH/HR) =  0.47
```

```
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.48
   TOTAL AREA(ACRES) =     50.22       PEAK FLOW RATE(CFS) =      53.91


****************************************************************************
*
   FLOW PROCESS FROM NODE    328.00 TO NODE    328.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  20.57
   *  10 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
   COMMERCIAL                 A        2.60      0.98      0.10    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    3.84
   EFFECTIVE AREA(ACRES) =     49.60   AREA-AVERAGED Fm(INCH/HR) =  0.45
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.46
   TOTAL AREA(ACRES) =     52.82       PEAK FLOW RATE(CFS) =      57.75


****************************************************************************
*
   FLOW PROCESS FROM NODE    328.00 TO NODE    329.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   746.40  DOWNSTREAM(FEET) =   746.30
   FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.4 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   5.66
   ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     57.75
   PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =  20.71
   LONGEST FLOWPATH FROM NODE    308.00 TO NODE    329.00 =  4055.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  20.71
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.732
   SUBAREA LOSS RATE DATA(AMC  II):
```

```
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   COMMERCIAL                 A        0.95      0.98       0.10    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA AREA(ACRES) =    0.95      SUBAREA RUNOFF(CFS) =    1.40
   EFFECTIVE AREA(ACRES) =     50.55   AREA-AVERAGED Fm(INCH/HR) =  0.44
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.45
   TOTAL AREA(ACRES) =     53.77       PEAK FLOW RATE(CFS) =      58.81


****************************************************************************
*
   FLOW PROCESS FROM NODE    329.00 TO NODE    330.00 IS CODE =  31

----------------------------------------------------------------------------
-
   >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

============================================================================
=
   ELEVATION DATA: UPSTREAM(FEET) =   746.30  DOWNSTREAM(FEET) =   744.00
   FLOW LENGTH(FEET) =   500.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.7 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   7.80
   ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =     58.81
   PIPE TRAVEL TIME(MIN.) =   1.07    Tc(MIN.) =  21.78
   LONGEST FLOWPATH FROM NODE    308.00 TO NODE    330.00 =  4555.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  21.78
   *  10 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
   COMMERCIAL                 A        1.65      0.98       0.10    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA AREA(ACRES) =    1.65      SUBAREA RUNOFF(CFS) =    2.35
   EFFECTIVE AREA(ACRES) =     52.20   AREA-AVERAGED Fm(INCH/HR) =  0.43
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.44
   TOTAL AREA(ACRES) =     55.42       PEAK FLOW RATE(CFS) =      58.83


****************************************************************************
*
   FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81

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-
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```
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

================================================================================
=
   MAINLINE Tc(MIN) =  21.78
   *  10 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
   RESIDENTIAL
   "5-7 DWELLINGS/ACRE"       A        5.54      0.98      0.50    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
   SUBAREA AREA(ACRES) =    5.54      SUBAREA RUNOFF(CFS) =    5.95
   EFFECTIVE AREA(ACRES) =     57.74   AREA-AVERAGED Fm(INCH/HR) =  0.43
   AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.45
   TOTAL AREA(ACRES) =     60.96       PEAK FLOW RATE(CFS) =      64.77


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****************************************************************************
*
   FLOW PROCESS FROM NODE    524.00 TO NODE    522.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

================================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   700.00
   ELEVATION DATA: UPSTREAM(FEET) =    754.20  DOWNSTREAM(FEET) =    751.40

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.604
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.334
   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.)
   COMMERCIAL                 A        0.92      0.98      0.10    32
12.60
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA RUNOFF(CFS) =      1.85
   TOTAL AREA(ACRES) =      0.92   PEAK FLOW RATE(CFS) =      1.85


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

```
*
   FLOW PROCESS FROM NODE    522.00 TO NODE    522.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  12.60
   *  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
   PUBLIC PARK                A        0.78      0.98      0.85    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.85
   SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    1.06
   EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.43
   AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.44
   TOTAL AREA(ACRES) =      1.70       PEAK FLOW RATE(CFS) =       2.91


****************************************************************************
*
   FLOW PROCESS FROM NODE    522.00 TO NODE    523.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   820.00
   ELEVATION DATA: UPSTREAM(FEET) =    755.00  DOWNSTREAM(FEET) =    748.20

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.605
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.452
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   COMMERCIAL                 A        0.80      0.98      0.10    32
11.61
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA RUNOFF(CFS) =      1.70
   TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      1.70


****************************************************************************
*
   FLOW PROCESS FROM NODE    523.00 TO NODE    524.00 IS CODE =  62

----------------------------------------------------------------------------
-
   >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
   >>>>>(STREET TABLE SECTION #  2 USED)<<<<<

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```
=
   UPSTREAM ELEVATION(FEET) =  748.20  DOWNSTREAM ELEVATION(FEET) =  747.70
   STREET LENGTH(FEET) =   565.00   CURB HEIGHT(INCHES) =  8.0
   STREET HALFWIDTH(FEET) = 32.00

   DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  27.00
   INSIDE STREET CROSSFALL(DECIMAL) =  0.020
   OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

   SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
   Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =
0.0150

     **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.25
     STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
     STREET FLOW DEPTH(FEET) =  0.47
     HALFSTREET FLOOD WIDTH(FEET) =   15.45
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.87
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.41
   STREET FLOW TRAVEL TIME(MIN.) =  10.80   Tc(MIN.) =  22.41
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.652
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   COMMERCIAL                 A        0.78      0.98      0.10    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    1.09
   EFFECTIVE AREA(ACRES) =      1.58    AREA-AVERAGED Fm(INCH/HR) =  0.10
   AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
   TOTAL AREA(ACRES) =      1.58        PEAK FLOW RATE(CFS) =       2.21

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  15.33
   FLOW VELOCITY(FEET/SEC.) =  0.87   DEPTH*VELOCITY(FT*FT/SEC.) =   0.40
   LONGEST FLOWPATH FROM NODE    522.00 TO NODE    524.00 =  1385.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    524.00 TO NODE    524.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =  22.41
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.652
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   PUBLIC PARK                A        1.37      0.98      0.85    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.85
   SUBAREA AREA(ACRES) =    1.37      SUBAREA RUNOFF(CFS) =    1.02
   EFFECTIVE AREA(ACRES) =      2.95   AREA-AVERAGED Fm(INCH/HR) =  0.44
   AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.45
   TOTAL AREA(ACRES) =      2.95        PEAK FLOW RATE(CFS) =       3.23
```

```
****************************************************************************
*
   FLOW PROCESS FROM NODE    520.00 TO NODE    518.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   683.00
   ELEVATION DATA: UPSTREAM(FEET) =    758.20  DOWNSTREAM(FEET) =    745.20

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.136
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.831
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   COMMERCIAL                 A        0.84      0.98      0.10    32
9.14
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA RUNOFF(CFS) =      2.07
   TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      2.07


****************************************************************************
*
   FLOW PROCESS FROM NODE    518.00 TO NODE    518.00 IS CODE =  81

----------------------------------------------------------------------------
-
   >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

============================================================================
=
   MAINLINE Tc(MIN) =   9.14
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.831
   SUBAREA LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
   PUBLIC PARK                A        0.56      0.98      0.85    32
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.85
   SUBAREA AREA(ACRES) =    0.56      SUBAREA RUNOFF(CFS) =    1.01
   EFFECTIVE AREA(ACRES) =      1.40   AREA-AVERAGED Fm(INCH/HR) =  0.39
   AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.40
   TOTAL AREA(ACRES) =      1.40       PEAK FLOW RATE(CFS) =       3.08


****************************************************************************
*
   FLOW PROCESS FROM NODE    514.00 TO NODE    516.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

```
==========================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   705.00
   ELEVATION DATA: UPSTREAM(FEET) =    760.00  DOWNSTREAM(FEET) =    745.80

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.148
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.828
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   COMMERCIAL                 A        1.50      0.98      0.10    32
9.15
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA RUNOFF(CFS) =      3.69
   TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      3.69


**************************************************************************
*
   FLOW PROCESS FROM NODE    510.00 TO NODE    512.00 IS CODE =  21

--------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

==========================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   600.00
   ELEVATION DATA: UPSTREAM(FEET) =    753.00  DOWNSTREAM(FEET) =    752.40

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.636
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.050
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   COMMERCIAL                 A        1.50      0.98      0.10    32
15.64
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA RUNOFF(CFS) =      2.64
   TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      2.64


+-------------------------------------------------------------------------
+
 | East riverside Drive
|
 |
|
 |
|

+-------------------------------------------------------------------------
+
```

```
****************************************************************************
*
   FLOW PROCESS FROM NODE    500.00 TO NODE    502.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   758.00
   ELEVATION DATA: UPSTREAM(FEET) =    774.10  DOWNSTREAM(FEET) =    769.10

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.773
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.431
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   COMMERCIAL                 A        0.91      0.98      0.10    32
11.77
   COMMERCIAL                 C        0.39      0.57      0.10    69
11.77
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA RUNOFF(CFS) =      2.74
   TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      2.74


****************************************************************************
*
   FLOW PROCESS FROM NODE    502.00 TO NODE    502.00 IS CODE =   1

----------------------------------------------------------------------------
-
   >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

============================================================================
=
   TOTAL NUMBER OF STREAMS =  2
   CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
   TIME OF CONCENTRATION(MIN.) =  11.77
   RAINFALL INTENSITY(INCH/HR) =   2.43
   AREA-AVERAGED Fm(INCH/HR) =  0.09
   AREA-AVERAGED Fp(INCH/HR) =  0.85
   AREA-AVERAGED Ap =  0.10
   EFFECTIVE STREAM AREA(ACRES) =     1.30
   TOTAL STREAM AREA(ACRES) =     1.30
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.74


****************************************************************************
*
   FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

```
==========================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   452.00
   ELEVATION DATA: UPSTREAM(FEET) =    773.30  DOWNSTREAM(FEET) =    769.10

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.939
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.868
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   COMMERCIAL                 A        0.55      0.98      0.10    32
8.94
   COMMERCIAL                 C        0.22      0.57      0.10    69
8.94
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.86
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
   SUBAREA RUNOFF(CFS) =      1.93
   TOTAL AREA(ACRES) =      0.77   PEAK FLOW RATE(CFS) =      1.93


**************************************************************************
*
   FLOW PROCESS FROM NODE    502.00 TO NODE    502.00 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.) =   8.94
   RAINFALL INTENSITY(INCH/HR) =   2.87
   AREA-AVERAGED Fm(INCH/HR) =  0.09
   AREA-AVERAGED Fp(INCH/HR) =  0.86
   AREA-AVERAGED Ap =  0.10
   EFFECTIVE STREAM AREA(ACRES) =     0.77
   TOTAL STREAM AREA(ACRES) =     0.77
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.93

   ** CONFLUENCE DATA **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      2.74  11.77    2.431  0.85( 0.09) 0.10     1.3     500.00
       2      1.93   8.94    2.868  0.86( 0.09) 0.10     0.8     501.00

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

   ** PEAK FLOW RATE TABLE **
    STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
    NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
       1      4.40   8.94    2.868  0.85( 0.09) 0.10     1.8     501.00
       2      4.37  11.77    2.431  0.85( 0.09) 0.10     2.1     500.00

   COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
   PEAK FLOW RATE(CFS) =      4.40    Tc(MIN.) =     8.94
   EFFECTIVE AREA(ACRES) =     1.76   AREA-AVERAGED Fm(INCH/HR) =  0.09
```

```
   AREA-AVERAGED Fp(INCH/HR) =  0.85  AREA-AVERAGED Ap =  0.10
   TOTAL AREA(ACRES) =      2.07
   LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =   758.00 FEET.


****************************************************************************
*
   FLOW PROCESS FROM NODE    505.00 TO NODE    507.00 IS CODE =  21

----------------------------------------------------------------------------
-
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
   >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

============================================================================
=
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   572.00
   ELEVATION DATA: UPSTREAM(FEET) =    773.30  DOWNSTREAM(FEET) =    761.90

   Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
   SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.432
   *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.970
   SUBAREA Tc AND LOSS RATE DATA(AMC  II):
    DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
(MIN.)
   COMMERCIAL                 A        1.11      0.98      0.10    32
8.43
   PUBLIC PARK                A        0.34      0.98      0.85    32
13.40
   SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
   SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.28
   SUBAREA RUNOFF(CFS) =      3.53
   TOTAL AREA(ACRES) =      1.45   PEAK FLOW RATE(CFS) =      3.53

============================================================================
=
   END OF STUDY SUMMARY:
   TOTAL AREA(ACRES)     =      1.45  TC(MIN.) =      8.43
   EFFECTIVE AREA(ACRES) =      1.45  AREA-AVERAGED Fm(INCH/HR)=  0.27
   AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.28
   PEAK FLOW RATE(CFS)   =      3.53

============================================================================
=

============================================================================
=
   END OF RATIONAL METHOD ANALYSIS
```

```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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            Ver. 8.0  Release Date: 01/01/2003  License ID 1269

                        Analysis prepared by:

                           MDS Consulting
                     17320 Redhill Avenue, Suite 350
                            Irvine, CA 92614
                             949-721-8821


 ************************* DESCRIPTION OF STUDY *************************
* Armstrong Ranch, City of Ontario                                      *
* Preliminary Hydrology                                                 *
* 100- year storm                                                       *
 ************************************************************************

  FILE NAME: 80350.DAT
  TIME/DATE OF STUDY: 08:49 11/04/2015
==============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.906
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.370
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.3700
  SLOPE OF INTENSITY DURATION CURVE = 0.6000

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====== =====  =======
  1   18.0     13.0    0.020/0.020/ ---    0.50    2.00 0.0313 0.167 0.0150
  2   32.0     27.0    0.020/0.020/ ---    0.67    2.00 0.0313 0.167 0.0150

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

******************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      3.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   860.00
  ELEVATION DATA: UPSTREAM(FEET) =    779.70  DOWNSTREAM(FEET) =    775.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.970
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.434
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        1.06      0.80      0.10    52   12.97
  PUBLIC PARK                A        0.44      0.80      0.85    52   20.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.32
  SUBAREA RUNOFF(CFS) =      4.29
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      4.29

******************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      5.00 IS CODE =  62
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  775.20  DOWNSTREAM ELEVATION(FEET) =  767.50
  STREET LENGTH(FEET) =   960.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.36
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   15.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.60
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.19
  STREET FLOW TRAVEL TIME(MIN.) =   6.16   Tc(MIN.) =  19.13
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.720
```

```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.50      0.80       0.10    52
  PUBLIC PARK                A        0.30      0.80       0.85    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.23
  SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    4.12
  EFFECTIVE AREA(ACRES) =      3.30    AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =      3.30        PEAK FLOW RATE(CFS) =       7.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  16.03
  FLOW VELOCITY(FEET/SEC.) =  2.70   DEPTH*VELOCITY(FT*FT/SEC.) =   1.29
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =  1820.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE     10.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   760.50  DOWNSTREAM(FEET) =   754.60
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.80
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      7.44
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  19.19
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =  1870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  19.19
  RAINFALL INTENSITY(INCH/HR) =   2.72
  AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.27
  EFFECTIVE STREAM AREA(ACRES) =     3.30
  TOTAL STREAM AREA(ACRES) =     3.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.44

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      9.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   850.00
  ELEVATION DATA: UPSTREAM(FEET) =    773.30  DOWNSTREAM(FEET) =    762.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.782
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.311
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        4.18      0.80       0.50    52   13.78
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =     10.96
  TOTAL AREA(ACRES) =      4.18   PEAK FLOW RATE(CFS) =     10.96

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.30  DOWNSTREAM(FEET) =   754.60
  FLOW LENGTH(FEET) =   190.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.75
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.96
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =  14.45
  LONGEST FLOWPATH FROM NODE      7.00 TO NODE     10.00 =  1040.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 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.) =  14.45
  RAINFALL INTENSITY(INCH/HR) =   3.22
  AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =     4.18
  TOTAL STREAM AREA(ACRES) =     4.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.96
```

```
  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      7.44  19.19    2.715  0.80( 0.21) 0.27     3.3       1.00
      2     10.96  14.45    3.219  0.80( 0.40) 0.50     4.2       7.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     17.69  14.45    3.219  0.80( 0.33) 0.41     6.7       7.00
      2     16.45  19.19    2.715  0.80( 0.32) 0.40     7.5       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     17.69    Tc(MIN.) =    14.45
  EFFECTIVE AREA(ACRES) =     6.67   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =      7.48
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =  1870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     10.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   754.60  DOWNSTREAM(FEET) =   752.10
  FLOW LENGTH(FEET) =   690.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.21
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     17.69
  PIPE TRAVEL TIME(MIN.) =   2.21    Tc(MIN.) =  16.66
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.10 =  2560.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     10.10 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.) =  16.66
  RAINFALL INTENSITY(INCH/HR) =   2.96
  AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =     6.67
  TOTAL STREAM AREA(ACRES) =      7.48
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.69

****************************************************************************
  FLOW PROCESS FROM NODE     10.30 TO NODE     10.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   900.00
  ELEVATION DATA: UPSTREAM(FEET) =    765.20  DOWNSTREAM(FEET) =    760.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.569
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.965
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        2.52      0.80      0.50    52   16.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =      5.82
  TOTAL AREA(ACRES) =      2.52   PEAK FLOW RATE(CFS) =      5.82

****************************************************************************
  FLOW PROCESS FROM NODE     10.20 TO NODE     10.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   753.00  DOWNSTREAM(FEET) =   752.10
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.58
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.82
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =  16.75
  LONGEST FLOWPATH FROM NODE     10.30 TO NODE     10.10 =   970.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     10.10 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.) =  16.75
  RAINFALL INTENSITY(INCH/HR) =   2.95
  AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.80
```

```
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =     2.52
  TOTAL STREAM AREA(ACRES) =     2.52
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.82

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     17.69  16.66    2.956  0.80( 0.33) 0.41     6.7       7.00
      1     16.45  21.41    2.543  0.80( 0.32) 0.40     7.5       1.00
      2      5.82  16.75    2.946  0.80( 0.40) 0.50     2.5      10.30

  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     23.51  16.66    2.956  0.80( 0.35) 0.44     9.2       7.00
      2     23.49  16.75    2.946  0.80( 0.35) 0.44     9.2      10.30
      3     21.35  21.41    2.543  0.80( 0.34) 0.42    10.0       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     23.51    Tc(MIN.) =    16.66
  EFFECTIVE AREA(ACRES) =     9.17   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =     10.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.10 =  2560.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   752.10  DOWNSTREAM(FEET) =   751.90
  FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.09
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     23.51
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =  16.90
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =  2634.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  16.90
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.930
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.39      0.80       0.10    52
  COMMERCIAL                 C        1.26      0.27       0.10    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA AREA(ACRES) =    2.65      SUBAREA RUNOFF(CFS) =    6.86
  EFFECTIVE AREA(ACRES) =    11.82   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.78  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =     12.65       PEAK FLOW RATE(CFS) =      28.17

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  16.90
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.930
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                C        0.75      0.27       0.85    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.85
  SUBAREA AREA(ACRES) =    0.75      SUBAREA RUNOFF(CFS) =    1.82
  EFFECTIVE AREA(ACRES) =    12.57   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.71  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =     13.40       PEAK FLOW RATE(CFS) =      29.99

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     69.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   751.90  DOWNSTREAM(FEET) =   746.50
  FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.87
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     29.99
  PIPE TRAVEL TIME(MIN.) =   1.03    Tc(MIN.) =  17.93
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     69.00 =  3184.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     69.00 TO NODE     69.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

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

```
 FLOW PROCESS FROM NODE     40.00 TO NODE     42.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   770.00
 ELEVATION DATA: UPSTREAM(FEET) =    768.80  DOWNSTREAM(FEET) =    760.90

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.878
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.298
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        4.05      0.80      0.50    52   13.88
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA RUNOFF(CFS) =     10.57
 TOTAL AREA(ACRES) =      4.05   PEAK FLOW RATE(CFS) =     10.57

****************************************************************************
 FLOW PROCESS FROM NODE     42.00 TO NODE     42.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  13.88
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.298
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        0.88      0.80      0.50    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =    0.88      SUBAREA RUNOFF(CFS) =    2.30
 EFFECTIVE AREA(ACRES) =      4.93   AREA-AVERAGED Fm(INCH/HR) =  0.40
 AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =      4.93       PEAK FLOW RATE(CFS) =      12.87

****************************************************************************
 FLOW PROCESS FROM NODE     42.00 TO NODE     42.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   753.90  DOWNSTREAM(FEET) =   752.80
 FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.08
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     12.87
 PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =  14.76
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.10 =  1040.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     42.10 TO NODE     42.10 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  14.76
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.178
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        1.45      0.80      0.50    52
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.17      0.27      0.50    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =    1.62      SUBAREA RUNOFF(CFS) =    4.09
 EFFECTIVE AREA(ACRES) =      6.55   AREA-AVERAGED Fm(INCH/HR) =  0.39
 AREA-AVERAGED Fp(INCH/HR) =  0.78  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =      6.55       PEAK FLOW RATE(CFS) =      16.43

****************************************************************************
 FLOW PROCESS FROM NODE     42.10 TO NODE     42.20 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   752.80  DOWNSTREAM(FEET) =   751.40
 FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.88
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     16.43
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  14.81
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.20 =  1075.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     42.10 TO NODE     42.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  14.81
 RAINFALL INTENSITY(INCH/HR) =   3.17
 AREA-AVERAGED Fm(INCH/HR) =  0.39
 AREA-AVERAGED Fp(INCH/HR) =  0.78
 AREA-AVERAGED Ap =  0.50
```

```
  EFFECTIVE STREAM AREA(ACRES) =     6.55
  TOTAL STREAM AREA(ACRES) =      6.55
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.43

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     43.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   630.00
  ELEVATION DATA: UPSTREAM(FEET) =    770.20  DOWNSTREAM(FEET) =    763.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.873
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.450
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        4.00      0.80      0.50    52   12.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =     10.99
  TOTAL AREA(ACRES) =      4.00   PEAK FLOW RATE(CFS) =     10.99

****************************************************************************
  FLOW PROCESS FROM NODE     43.10 TO NODE     43.20 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  763.90  DOWNSTREAM ELEVATION(FEET) =  762.80
  STREET LENGTH(FEET) =   240.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.02
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   16.47
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.07
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.01
  STREET FLOW TRAVEL TIME(MIN.) =   1.93   Tc(MIN.) =  14.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.172
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        0.83      0.80      0.50    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.07
  EFFECTIVE AREA(ACRES) =      4.83    AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =      4.83        PEAK FLOW RATE(CFS) =      12.06

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  16.53
  FLOW VELOCITY(FEET/SEC.) =  2.06   DEPTH*VELOCITY(FT*FT/SEC.) =   1.01
  LONGEST FLOWPATH FROM NODE     43.00 TO NODE     43.20 =   870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.30 TO NODE     42.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.80
  RAINFALL INTENSITY(INCH/HR) =   3.17
  AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =     4.83
  TOTAL STREAM AREA(ACRES) =     4.83
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.06

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     16.43  14.81    3.172  0.78( 0.39) 0.50     6.6      40.00
      2     12.06  14.80    3.172  0.80( 0.40) 0.50     4.8      43.00

  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     28.48  14.80    3.172  0.79( 0.39) 0.50    11.4      43.00
      2     28.48  14.81    3.172  0.79( 0.39) 0.50    11.4      40.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     28.48    Tc(MIN.) =    14.80
  EFFECTIVE AREA(ACRES) =    11.38   AREA-AVERAGED Fm(INCH/HR) =  0.39
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.79  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =     11.38
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.30 =  1075.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     43.20 TO NODE     43.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  14.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.172
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        1.77      0.80      0.50    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    1.77      SUBAREA RUNOFF(CFS) =    4.42
  EFFECTIVE AREA(ACRES) =    13.15   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.79  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =     13.15       PEAK FLOW RATE(CFS) =      32.87

****************************************************************************
  FLOW PROCESS FROM NODE     43.20 TO NODE     43.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  762.80  DOWNSTREAM ELEVATION(FEET) =  761.10
  STREET LENGTH(FEET) =   238.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.59
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
         NOTE: STREET FLOW EXCEEDS TOP OF CURB.
         THE FOLLOWING STREET FLOW RESULTS ARE BASED ON THE ASSUMPTION
         THAT NEGLIBLE FLOW OCCURS OUTSIDE OF THE STREET CHANNEL.
         THAT IS, ALL FLOW ALONG THE PARKWAY, ETC., IS NEGLECTED.
    STREET FLOW DEPTH(FEET) =  0.60
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.47
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.10
  STREET FLOW TRAVEL TIME(MIN.) =   1.14   Tc(MIN.) =  15.95
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.034
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        1.45      0.80      0.50    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    1.45      SUBAREA RUNOFF(CFS) =    3.44
  EFFECTIVE AREA(ACRES) =     14.60    AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.79  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =     14.60        PEAK FLOW RATE(CFS) =      34.67

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  3.48   DEPTH*VELOCITY(FT*FT/SEC.) =   2.10
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.30 =  1313.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     43.30 TO NODE     42.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   754.10  DOWNSTREAM(FEET) =   751.40
  FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.17
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     34.67
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =  16.44
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.20 =  1583.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.20 TO NODE     42.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   751.40  DOWNSTREAM(FEET) =   750.40
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.52
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     34.67
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =  17.08
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.30 =  1833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.30 TO NODE     42.30 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN) =  17.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.912
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        1.09      0.80      0.50    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.49      0.27      0.50    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.63
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    1.58      SUBAREA RUNOFF(CFS) =    3.69
  EFFECTIVE AREA(ACRES) =    16.18   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.77  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =     16.18       PEAK FLOW RATE(CFS) =      36.76

********************************************************************************
  FLOW PROCESS FROM NODE     42.30 TO NODE     56.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   750.40  DOWNSTREAM(FEET) =   749.50
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.78
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     36.76
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =  17.59
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     56.00 =  2043.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     56.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN) =  17.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.860
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.62      0.27      0.50    86
  PUBLIC PARK                C        1.30      0.27      0.85    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.59
  SUBAREA AREA(ACRES) =    4.92      SUBAREA RUNOFF(CFS) =   11.95
  EFFECTIVE AREA(ACRES) =    21.10   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.64  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =     21.10       PEAK FLOW RATE(CFS) =      47.96

********************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     59.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   749.50  DOWNSTREAM(FEET) =   747.10
  FLOW LENGTH(FEET) =   620.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.87
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     47.96
  PIPE TRAVEL TIME(MIN.) =   1.50    Tc(MIN.) =  19.10
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     59.00 =  2663.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  19.10
  RAINFALL INTENSITY(INCH/HR) =   2.72
  AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.64
  AREA-AVERAGED Ap =  0.52
  EFFECTIVE STREAM AREA(ACRES) =    21.10
  TOTAL STREAM AREA(ACRES) =    21.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     47.96

********************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     59.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   620.00
  ELEVATION DATA: UPSTREAM(FEET) =    761.50  DOWNSTREAM(FEET) =    759.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.162
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.903
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        3.49      0.27      0.60    86   17.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
```

```
  SUBAREA RUNOFF(CFS) =      8.61
  TOTAL AREA(ACRES) =      3.49   PEAK FLOW RATE(CFS) =      8.61

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 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.) =  17.16
  RAINFALL INTENSITY(INCH/HR) =   2.90
  AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =     3.49
  TOTAL STREAM AREA(ACRES) =     3.49
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.61

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     47.96  19.10    2.723  0.64( 0.33) 0.52    21.1      43.00
      1     47.95  19.10    2.723  0.64( 0.33) 0.52    21.1      40.00
      2      8.61  17.16    2.903  0.27( 0.16) 0.60     3.5      58.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     54.96  17.16    2.903  0.58( 0.31) 0.53    22.5      58.00
      2     56.00  19.10    2.723  0.58( 0.31) 0.53    24.6      43.00
      3     55.99  19.10    2.723  0.58( 0.31) 0.53    24.6      40.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     56.00    Tc(MIN.) =    19.10
  EFFECTIVE AREA(ACRES) =    24.59   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =     24.59
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     59.00 =  2663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     67.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   747.70  DOWNSTREAM(FEET) =   747.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.20
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     56.00
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  19.16
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     67.00 =  2708.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     67.00 TO NODE     67.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     62.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    764.00  DOWNSTREAM(FEET) =    759.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.429
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.158
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        2.25      0.27      0.60    86    9.43
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
  SUBAREA RUNOFF(CFS) =      8.09
  TOTAL AREA(ACRES) =      2.25   PEAK FLOW RATE(CFS) =      8.09

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     66.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   752.70  DOWNSTREAM(FEET) =   752.10
  FLOW LENGTH(FEET) =   165.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.36
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.09
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =  10.06
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     66.00 =   465.00 FEET.

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

```
 FLOW PROCESS FROM NODE     66.00 TO NODE     66.00 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.) =  10.06
 RAINFALL INTENSITY(INCH/HR) =   4.00
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.60
 EFFECTIVE STREAM AREA(ACRES) =     2.25
 TOTAL STREAM AREA(ACRES) =     2.25
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.09

****************************************************************************
 FLOW PROCESS FROM NODE     63.00 TO NODE     65.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   270.00
 ELEVATION DATA: UPSTREAM(FEET) =    763.60  DOWNSTREAM(FEET) =    760.30

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.812
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.331
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        1.38      0.27       0.50    86    8.81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA RUNOFF(CFS) =      5.21
 TOTAL AREA(ACRES) =      1.38   PEAK FLOW RATE(CFS) =      5.21

****************************************************************************
 FLOW PROCESS FROM NODE     65.00 TO NODE     66.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   753.30  DOWNSTREAM(FEET) =   752.10
 FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.08
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      5.21
 PIPE TRAVEL TIME(MIN.) =   1.23    Tc(MIN.) =  10.04
 LONGEST FLOWPATH FROM NODE     63.00 TO NODE     66.00 =   570.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     66.00 TO NODE     66.00 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.) =  10.04
 RAINFALL INTENSITY(INCH/HR) =   4.01
 AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.27
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =     1.38
 TOTAL STREAM AREA(ACRES) =     1.38
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.21

 ** CONFLUENCE DATA **
  STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1      8.09  10.06    4.000  0.27( 0.16) 0.60     2.2      60.00
     2      5.21  10.04    4.005  0.27( 0.14) 0.50     1.4      63.00

 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     13.29  10.04    4.005  0.27( 0.15) 0.56     3.6      63.00
     2     13.29  10.06    4.000  0.27( 0.15) 0.56     3.6      60.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     13.29    Tc(MIN.) =    10.04
 EFFECTIVE AREA(ACRES) =     3.63   AREA-AVERAGED Fm(INCH/HR) =  0.15
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.56
 TOTAL AREA(ACRES) =      3.63
 LONGEST FLOWPATH FROM NODE     63.00 TO NODE     66.00 =   570.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     66.00 TO NODE     67.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   752.10  DOWNSTREAM(FEET) =   747.00
 FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.89
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     13.29
```

```
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =  10.23
  LONGEST FLOWPATH FROM NODE     63.00 TO NODE     67.00 =   710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     67.00 TO NODE     67.00 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     13.29  10.23    3.959  0.27( 0.15) 0.56     3.6      63.00
      2     13.29  10.26    3.954  0.27( 0.15) 0.56     3.6      60.00
  LONGEST FLOWPATH FROM NODE     63.00 TO NODE     67.00 =   710.00 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     54.96  17.22    2.897  0.58( 0.31) 0.53    22.5      58.00
      2     56.00  19.16    2.718  0.58( 0.31) 0.53    24.6      43.00
      3     55.99  19.16    2.717  0.58( 0.31) 0.53    24.6      40.00
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     67.00 =  2708.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     59.35  10.23    3.959  0.51( 0.27) 0.54    17.0      63.00
      2     59.38  10.26    3.954  0.51( 0.27) 0.54    17.0      60.00
      3     64.56  17.22    2.897  0.53( 0.29) 0.54    26.1      58.00
      4     64.97  19.16    2.718  0.54( 0.29) 0.54    28.2      43.00
      5     64.96  19.16    2.717  0.54( 0.29) 0.54    28.2      40.00
    TOTAL AREA(ACRES) =     28.22

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       64.97  Tc(MIN.) =   19.157
  EFFECTIVE AREA(ACRES) =     28.22  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.54  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =     28.22
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     67.00 =  2708.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     67.00 TO NODE     69.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   747.00  DOWNSTREAM(FEET) =   746.50
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  35.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.01
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     64.97
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =  19.51
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     69.00 =  2858.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     69.00 TO NODE     69.00 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     59.35  10.59    3.878  0.51( 0.27) 0.54    17.0      63.00
      2     59.38  10.62    3.873  0.51( 0.27) 0.54    17.0      60.00
      3     64.56  17.58    2.861  0.53( 0.29) 0.54    26.1      58.00
      4     64.97  19.51    2.688  0.54( 0.29) 0.54    28.2      43.00
      5     64.96  19.52    2.687  0.54( 0.29) 0.54    28.2      40.00
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     69.00 =  2858.00 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     29.99  17.93    2.828  0.71( 0.28) 0.39    12.6       7.00
      2     29.96  18.02    2.819  0.71( 0.28) 0.39    12.6      10.30
      3     27.13  22.73    2.453  0.72( 0.28) 0.38    13.4       1.00
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     69.00 =  3184.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     84.37  10.59    3.878  0.56( 0.28) 0.49    24.4      63.00
      2     84.42  10.62    3.873  0.56( 0.28) 0.49    24.4      60.00
      3     94.35  17.58    2.861  0.58( 0.28) 0.49    38.4      58.00
      4     94.63  17.93    2.828  0.58( 0.28) 0.49    39.0       7.00
      5     94.61  18.02    2.819  0.58( 0.28) 0.49    39.2      10.30
      6     94.03  19.51    2.688  0.58( 0.29) 0.49    41.1      43.00
      7     94.02  19.52    2.687  0.58( 0.29) 0.49    41.1      40.00
      8     85.74  22.73    2.453  0.59( 0.29) 0.49    41.6       1.00
    TOTAL AREA(ACRES) =     41.62

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       94.63  Tc(MIN.) =   17.932
  EFFECTIVE AREA(ACRES) =     39.04  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =     41.62
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     69.00 =  3184.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     69.00 TO NODE     69.00 IS CODE =  10
----------------------------------------------------------------------------
```

```
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
================================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   950.00
  ELEVATION DATA: UPSTREAM(FEET) =    771.70  DOWNSTREAM(FEET) =    765.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.269
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.998
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.84      0.27      0.50    86   16.27
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =      9.89
  TOTAL AREA(ACRES) =      3.84   PEAK FLOW RATE(CFS) =      9.89

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   758.00  DOWNSTREAM(FEET) =   756.90
  FLOW LENGTH(FEET) =   245.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.90
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.89
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =  17.10
  LONGEST FLOWPATH FROM NODE     24.00 TO NODE     25.10 =  1195.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.10 TO NODE     25.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  17.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.909
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        3.18      0.27      0.50    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    3.18      SUBAREA RUNOFF(CFS) =    7.94
  EFFECTIVE AREA(ACRES) =      7.02   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =      7.02       PEAK FLOW RATE(CFS) =      17.52

****************************************************************************
  FLOW PROCESS FROM NODE     25.10 TO NODE     25.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  17.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.909
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        0.78      0.80      0.50    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.00      0.27      0.50    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    1.78      SUBAREA RUNOFF(CFS) =    4.26
  EFFECTIVE AREA(ACRES) =      8.80   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =      8.80       PEAK FLOW RATE(CFS) =      21.78

****************************************************************************
  FLOW PROCESS FROM NODE     25.10 TO NODE     29.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   756.90  DOWNSTREAM(FEET) =   755.90
  FLOW LENGTH(FEET) =   295.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.39
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     21.78
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =  18.02
  LONGEST FLOWPATH FROM NODE     24.00 TO NODE     29.00 =  1490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 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.) =  18.02
```

```
  RAINFALL INTENSITY(INCH/HR) =   2.82
  AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.32
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =     8.80
  TOTAL STREAM AREA(ACRES) =     8.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.78

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   995.00
  ELEVATION DATA: UPSTREAM(FEET) =    773.30  DOWNSTREAM(FEET) =    766.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.488
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.974
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        1.67      0.80      0.50    52   16.49
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.78      0.27      0.50    86   16.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.63
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =      5.86
  TOTAL AREA(ACRES) =      2.45   PEAK FLOW RATE(CFS) =      5.86

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     29.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  766.10  DOWNSTREAM ELEVATION(FEET) =  762.90
  STREET LENGTH(FEET) =   630.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.71
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.52   FLOOD WIDTH(FEET) =   18.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    2.29
    SPLIT DEPTH(FEET) =    0.29   SPLIT FLOOD WIDTH(FEET) =    6.41
    SPLIT FLOW(CFS) =    0.85   SPLIT VELOCITY(FEET/SEC.) =    1.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
         NOTE: STREET FLOW EXCEEDS TOP OF CURB.
         THE FOLLOWING STREET FLOW RESULTS ARE BASED ON THE ASSUMPTION
         THAT NEGLIBLE FLOW OCCURS OUTSIDE OF THE STREET CHANNEL.
         THAT IS, ALL FLOW ALONG THE PARKWAY, ETC., IS NEGLECTED.
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.29
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.19
  STREET FLOW TRAVEL TIME(MIN.) =   4.58   Tc(MIN.) =  21.07
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.567
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.60      0.27      0.50    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    5.69
  EFFECTIVE AREA(ACRES) =      5.05    AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =      5.05        PEAK FLOW RATE(CFS) =      10.65

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  2.29   DEPTH*VELOCITY(FT*FT/SEC.) =   1.19
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  630.0 FT WITH ELEVATION-DROP =   3.2 FT, IS    7.1 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE     29.00
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     29.00 =  1625.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 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.) =  21.07
  RAINFALL INTENSITY(INCH/HR) =   2.57
  AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.45
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =     5.05
  TOTAL STREAM AREA(ACRES) =     5.05
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.65
```

```
 ** CONFLUENCE DATA **
  STREAM      Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1     21.78  18.02    2.820  0.32( 0.16) 0.50     8.8      24.00
     2     10.65  21.07    2.567  0.45( 0.22) 0.50     5.0      20.00

 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     31.87  18.02    2.820  0.36( 0.18) 0.50    13.1      24.00
     2     30.36  21.07    2.567  0.36( 0.18) 0.50    13.9      20.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     31.87    Tc(MIN.) =    18.02
 EFFECTIVE AREA(ACRES) =    13.12   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =     13.85
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     29.00 =  1625.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     39.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   755.90  DOWNSTREAM(FEET) =   751.00
 FLOW LENGTH(FEET) =   380.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.79
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     31.87
 PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =  18.66
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     39.00 =  2005.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 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.) =  18.66
 RAINFALL INTENSITY(INCH/HR) =   2.76
 AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.36
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =    13.12
 TOTAL STREAM AREA(ACRES) =    13.85
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.87

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     32.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
 ELEVATION DATA: UPSTREAM(FEET) =    771.70  DOWNSTREAM(FEET) =    763.40

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.074
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.019
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        2.23      0.27      0.50    86   16.07
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA RUNOFF(CFS) =      5.79
 TOTAL AREA(ACRES) =      2.23   PEAK FLOW RATE(CFS) =      5.79

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  16.07
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.019
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        1.08      0.80      0.50    52
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       C        0.50      0.27      0.50    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.63
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
```

```
  SUBAREA AREA(ACRES) =    1.58      SUBAREA RUNOFF(CFS) =    3.85
  EFFECTIVE AREA(ACRES) =      3.81   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =      3.81       PEAK FLOW RATE(CFS) =       9.63

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   756.40  DOWNSTREAM(FEET) =   754.00
  FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.23
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.63
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =  16.80
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.10 =  1270.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.10 TO NODE     32.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  16.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.941
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        A        2.36      0.80      0.50    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        0.89      0.27      0.50    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.65
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    3.25      SUBAREA RUNOFF(CFS) =    7.65
  EFFECTIVE AREA(ACRES) =      7.06   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.53  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =      7.06       PEAK FLOW RATE(CFS) =      17.01

****************************************************************************
  FLOW PROCESS FROM NODE     32.10 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   754.00  DOWNSTREAM(FEET) =   752.60
  FLOW LENGTH(FEET) =   295.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.83
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     17.01
  PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =  17.64
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     34.00 =  1565.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  17.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.856
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        A        1.59      0.80      0.50    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        C        3.88      0.27      0.50    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    5.47      SUBAREA RUNOFF(CFS) =   13.01
  EFFECTIVE AREA(ACRES) =     12.53   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.48  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =     12.53       PEAK FLOW RATE(CFS) =      29.48

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     39.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   752.60  DOWNSTREAM(FEET) =   751.00
  FLOW LENGTH(FEET) =   440.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.95
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     29.48
  PIPE TRAVEL TIME(MIN.) =   1.23    Tc(MIN.) =  18.87
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     39.00 =  2005.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     39.00 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.) =  18.87
  RAINFALL INTENSITY(INCH/HR) =   2.74
  AREA-AVERAGED Fm(INCH/HR) =  0.24
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.48
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =    12.53
 TOTAL STREAM AREA(ACRES) =    12.53
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.48

 ** CONFLUENCE DATA **
  STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1     31.87  18.66    2.761  0.36( 0.18) 0.50    13.1      24.00
     1     30.36  21.72    2.521  0.36( 0.18) 0.50    13.9      20.00
     2     29.48  18.87    2.742  0.48( 0.24) 0.50    12.5      30.00

 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     61.24  18.66    2.761  0.42( 0.21) 0.50    25.5      24.00
     2     61.25  18.87    2.742  0.42( 0.21) 0.50    25.7      30.00
     3     57.23  21.72    2.521  0.42( 0.21) 0.50    26.4      20.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     61.25    Tc(MIN.) =    18.87
 EFFECTIVE AREA(ACRES) =    25.70   AREA-AVERAGED Fm(INCH/HR) =  0.21
 AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =     26.38
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     39.00 =  2005.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     69.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   751.00  DOWNSTREAM(FEET) =   746.50
 FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.07
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     61.25
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =  19.06
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     69.00 =  2175.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     69.00 TO NODE     69.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 3 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     61.24  18.85    2.744  0.42( 0.21) 0.50    25.5      24.00
     2     61.25  19.06    2.726  0.42( 0.21) 0.50    25.7      30.00
     3     57.23  21.91    2.507  0.42( 0.21) 0.50    26.4      20.00
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     69.00 =  2175.00 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1     84.37  10.59    3.878  0.56( 0.28) 0.49    24.4      63.00
     2     84.42  10.62    3.873  0.56( 0.28) 0.49    24.4      60.00
     3     94.35  17.58    2.861  0.58( 0.28) 0.49    38.4      58.00
     4     94.63  17.93    2.828  0.58( 0.28) 0.49    39.0       7.00
     5     94.61  18.02    2.819  0.58( 0.28) 0.49    39.2      10.30
     6     94.03  19.51    2.688  0.58( 0.29) 0.49    41.1      43.00
     7     94.02  19.52    2.687  0.58( 0.29) 0.49    41.1      40.00
     8     85.74  22.73    2.453  0.59( 0.29) 0.49    41.6       1.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     69.00 =  3184.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1    134.18  10.59    3.878  0.51( 0.25) 0.50    38.7      63.00
     2    134.27  10.62    3.873  0.51( 0.25) 0.50    38.8      60.00
     3    154.11  17.58    2.861  0.52( 0.26) 0.49    62.2      58.00
     4    154.81  17.93    2.828  0.52( 0.26) 0.49    63.3       7.00
     5    154.89  18.02    2.819  0.52( 0.26) 0.49    63.6      10.30
     6    155.53  18.85    2.744  0.52( 0.26) 0.49    65.7      24.00
     7    155.46  19.06    2.726  0.52( 0.26) 0.49    66.2      30.00
     8    154.65  19.51    2.688  0.52( 0.26) 0.49    66.9      43.00
     9    154.63  19.52    2.687  0.52( 0.26) 0.49    66.9      40.00
    10    145.09  21.91    2.507  0.52( 0.26) 0.49    67.9      20.00
    11    141.61  22.73    2.453  0.52( 0.26) 0.49    68.0       1.00
   TOTAL AREA(ACRES) =     68.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      155.53  Tc(MIN.) =   18.850
 EFFECTIVE AREA(ACRES) =     65.74  AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =     68.00
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     69.00 =  3184.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     69.00 TO NODE     70.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   746.50  DOWNSTREAM(FEET) =   744.50
 FLOW LENGTH(FEET) =   490.00   MANNING'S N =  0.013
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```
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.40
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    155.53
  PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =  19.72
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     70.00 =  3674.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE     70.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  19.72
  RAINFALL INTENSITY(INCH/HR) =   2.67
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.52
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =    65.74
  TOTAL STREAM AREA(ACRES) =    68.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    155.53

****************************************************************************
  FLOW PROCESS FROM NODE     70.10 TO NODE     70.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   928.00
  ELEVATION DATA: UPSTREAM(FEET) =    766.30  DOWNSTREAM(FEET) =    755.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.459
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.699
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.64      0.27      0.50    86   14.66
  COMMERCIAL                 C        2.98      0.27      0.10    86   11.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.17
  SUBAREA RUNOFF(CFS) =     11.90
  TOTAL AREA(ACRES) =      3.62   PEAK FLOW RATE(CFS) =     11.90

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE     70.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.46
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.699
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                C        1.07      0.27      0.85    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.85
  SUBAREA AREA(ACRES) =    1.07      SUBAREA RUNOFF(CFS) =    3.34
  EFFECTIVE AREA(ACRES) =      4.69   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.33
  TOTAL AREA(ACRES) =      4.69       PEAK FLOW RATE(CFS) =      15.24

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE     70.00 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.) =  11.46
  RAINFALL INTENSITY(INCH/HR) =   3.70
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  0.33
  EFFECTIVE STREAM AREA(ACRES) =     4.69
  TOTAL STREAM AREA(ACRES) =     4.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.24

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1    134.18  11.49    3.693  0.51( 0.25) 0.50    38.7      63.00
      1    134.27  11.52    3.688  0.51( 0.25) 0.50    38.8      60.00
      1    154.11  18.45    2.780  0.52( 0.26) 0.49    62.2      58.00
      1    154.81  18.80    2.749  0.52( 0.26) 0.49    63.3       7.00
      1    154.89  18.89    2.741  0.52( 0.26) 0.49    63.6      10.30
      1    155.53  19.72    2.671  0.52( 0.26) 0.49    65.7      24.00
      1    155.46  19.93    2.654  0.52( 0.26) 0.49    66.2      30.00
      1    154.65  20.38    2.619  0.52( 0.26) 0.49    66.9      43.00
      1    154.63  20.39    2.618  0.52( 0.26) 0.49    66.9      40.00
      1    145.09  22.78    2.449  0.52( 0.26) 0.49    67.9      20.00
      1    141.61  23.61    2.398  0.52( 0.26) 0.49    68.0       1.00
      2     15.24  11.46    3.699  0.27( 0.09) 0.33     4.7      70.10

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

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

```
     1    149.28  11.46    3.699  0.49( 0.23) 0.48    43.3      70.10
     2    149.39  11.49    3.693  0.49( 0.23) 0.48    43.4      63.00
     3    149.47  11.52    3.688  0.49( 0.23) 0.48    43.5      60.00
     4    165.47  18.45    2.780  0.51( 0.24) 0.48    66.9      58.00
     5    166.03  18.80    2.749  0.51( 0.24) 0.48    68.0       7.00
     6    166.09  18.89    2.741  0.51( 0.24) 0.48    68.2      10.30
     7    166.43  19.72    2.671  0.51( 0.24) 0.48    70.4      24.00
     8    166.29  19.93    2.654  0.51( 0.25) 0.48    70.9      30.00
     9    165.32  20.38    2.619  0.51( 0.25) 0.48    71.6      43.00
    10    165.30  20.39    2.618  0.51( 0.25) 0.48    71.6      40.00
    11    155.05  22.78    2.449  0.51( 0.25) 0.48    72.6      20.00
    12    151.35  23.61    2.398  0.51( 0.25) 0.48    72.7       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    166.43    Tc(MIN.) =    19.72
  EFFECTIVE AREA(ACRES) =    70.43   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =     72.69
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     70.00 =  3674.00 FEET.

+----------------------------------------------------------------------------+
| South-West Area                                                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   960.00
  ELEVATION DATA: UPSTREAM(FEET) =    764.00  DOWNSTREAM(FEET) =    755.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.613
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.960
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        2.32      0.80      0.60    52   16.61
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        5.06      0.27      0.60    86   16.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
  SUBAREA RUNOFF(CFS) =     17.92
  TOTAL AREA(ACRES) =      7.38   PEAK FLOW RATE(CFS) =     17.92

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  16.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.960
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        2.14      0.80      0.60    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
  SUBAREA AREA(ACRES) =    2.14      SUBAREA RUNOFF(CFS) =    4.78
  EFFECTIVE AREA(ACRES) =      9.52   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =      9.52       PEAK FLOW RATE(CFS) =      22.70

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   748.70  DOWNSTREAM(FEET) =   746.80
  FLOW LENGTH(FEET) =   480.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.80
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     22.70
  PIPE TRAVEL TIME(MIN.) =   1.38    Tc(MIN.) =  17.99
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =  1440.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  17.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.822
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        1.44      0.80      0.50    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.82      0.27      0.50    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    3.26      SUBAREA RUNOFF(CFS) =    7.54
  EFFECTIVE AREA(ACRES) =     12.78   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.57
```

```
  TOTAL AREA(ACRES) =     12.78       PEAK FLOW RATE(CFS) =      29.06

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    109.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   746.80  DOWNSTREAM(FEET) =   745.90
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.14
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     29.06
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =  18.62
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =  1670.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  18.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.765
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        A        1.81      0.80       0.50    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =     1.81      SUBAREA RUNOFF(CFS) =     3.86
  EFFECTIVE AREA(ACRES) =     14.59   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  0.57
  TOTAL AREA(ACRES) =     14.59       PEAK FLOW RATE(CFS) =      32.26

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 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.) =  18.62
  RAINFALL INTENSITY(INCH/HR) =   2.76
  AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.55
  AREA-AVERAGED Ap =  0.57
  EFFECTIVE STREAM AREA(ACRES) =    14.59
  TOTAL STREAM AREA(ACRES) =    14.59
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     32.26

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   710.00
  ELEVATION DATA: UPSTREAM(FEET) =    761.80  DOWNSTREAM(FEET) =    756.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.221
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.120
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        C        2.45      0.27       0.60    86   15.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
  SUBAREA RUNOFF(CFS) =      6.52
  TOTAL AREA(ACRES) =      2.45   PEAK FLOW RATE(CFS) =      6.52

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    109.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  756.60  DOWNSTREAM ELEVATION(FEET) =  753.00
  STREET LENGTH(FEET) =   600.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.68
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   14.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.23
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.02
  STREET FLOW TRAVEL TIME(MIN.) =   4.48   Tc(MIN.) =  19.70
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.672
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  "3-4 DWELLINGS/ACRE"       A        2.55      0.80      0.60    52
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        1.44      0.27      0.60    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
  SUBAREA AREA(ACRES) =    3.99      SUBAREA RUNOFF(CFS) =    8.29
  EFFECTIVE AREA(ACRES) =      6.44    AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.48  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =      6.44        PEAK FLOW RATE(CFS) =      13.82

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  16.53
  FLOW VELOCITY(FEET/SEC.) =  2.36   DEPTH*VELOCITY(FT*FT/SEC.) =   1.16
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    109.00 =  1310.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 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.) =  19.70
  RAINFALL INTENSITY(INCH/HR) =   2.67
  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.48
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =     6.44
  TOTAL STREAM AREA(ACRES) =     6.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.82

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     32.26  18.62    2.765  0.55( 0.31) 0.57    14.6     100.00
      2     13.82  19.70    2.672  0.48( 0.29) 0.60     6.4     104.00

  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     45.82  18.62    2.765  0.53( 0.30) 0.58    20.7     100.00
      2     44.86  19.70    2.672  0.52( 0.30) 0.58    21.0     104.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     45.82    Tc(MIN.) =    18.62
  EFFECTIVE AREA(ACRES) =    20.67   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.53  AREA-AVERAGED Ap =  0.58
  TOTAL AREA(ACRES) =     21.03
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =  1670.00 FEET.

+--------------------------------------------------------------------------+
| South-East Area                                                          |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   810.00
  ELEVATION DATA: UPSTREAM(FEET) =    764.00  DOWNSTREAM(FEET) =    757.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.968
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.151
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        4.60      0.80      0.50    52   14.97
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        4.60      0.27      0.50    86   14.97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.53
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =     23.88
  TOTAL AREA(ACRES) =      9.20   PEAK FLOW RATE(CFS) =     23.88

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   750.70  DOWNSTREAM(FEET) =   748.70
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.67
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     23.88
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =  15.51
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =  1060.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN) =  15.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.085
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        1.38      0.80      0.60    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.70      0.27      0.50    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.64
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.57
  SUBAREA AREA(ACRES) =    2.08      SUBAREA RUNOFF(CFS) =    5.10
  EFFECTIVE AREA(ACRES) =     11.28   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.56  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =     11.28       PEAK FLOW RATE(CFS) =      28.43

**************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    207.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   748.70  DOWNSTREAM(FEET) =   747.80
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.37
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     28.43
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =  16.06
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.00 =  1270.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  16.06
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.021
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        2.64      0.80      0.50    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    2.64      SUBAREA RUNOFF(CFS) =    6.23
  EFFECTIVE AREA(ACRES) =     13.92   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =     13.92       PEAK FLOW RATE(CFS) =      34.01

**************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    207.10 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   747.80  DOWNSTREAM(FEET) =   745.90
  FLOW LENGTH(FEET) =   320.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.51
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     34.01
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =  16.77
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.10 =  1590.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    207.10 TO NODE    207.10 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.) =  16.77
  RAINFALL INTENSITY(INCH/HR) =   2.94
  AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =    13.92
  TOTAL STREAM AREA(ACRES) =    13.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     34.01

**************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.10 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   900.00
  ELEVATION DATA: UPSTREAM(FEET) =    761.20  DOWNSTREAM(FEET) =    754.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.613
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.073
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        2.70      0.80      0.50    52   15.61
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.70      0.27      0.50    86   15.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.69
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
```

```
  SUBAREA RUNOFF(CFS) =      8.35
  TOTAL AREA(ACRES) =      3.40   PEAK FLOW RATE(CFS) =      8.35

****************************************************************************
  FLOW PROCESS FROM NODE    204.10 TO NODE    207.10 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  754.20  DOWNSTREAM ELEVATION(FEET) =  752.90
  STREET LENGTH(FEET) =   200.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.44
    HALFSTREET FLOOD WIDTH(FEET) =   13.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.23
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.97
  STREET FLOW TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =  17.11
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.909
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        0.83      0.27      0.50    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.07
  EFFECTIVE AREA(ACRES) =      4.23    AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.61  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =      4.23        PEAK FLOW RATE(CFS) =       9.92

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  14.16
  FLOW VELOCITY(FEET/SEC.) =  2.26   DEPTH*VELOCITY(FT*FT/SEC.) =   1.00
  LONGEST FLOWPATH FROM NODE    204.00 TO NODE    207.10 =  1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    207.10 TO NODE    207.10 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.) =  17.11
  RAINFALL INTENSITY(INCH/HR) =   2.91
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.61
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =     4.23
  TOTAL STREAM AREA(ACRES) =     4.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.92

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)      (ACRES)    NODE
      1     34.01  16.77    2.944  0.60( 0.31) 0.51    13.9     200.00
      2      9.92  17.11    2.909  0.61( 0.30) 0.50     4.2     204.00

  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     43.86  16.77    2.944  0.60( 0.31) 0.51    18.1     200.00
      2     43.48  17.11    2.909  0.60( 0.31) 0.51    18.1     204.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     43.86    Tc(MIN.) =    16.77
  EFFECTIVE AREA(ACRES) =    18.07   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =     18.15
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.10 =  1590.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    207.10 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  16.77
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.944
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        3.79      0.80      0.60    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
  SUBAREA AREA(ACRES) =    3.79      SUBAREA RUNOFF(CFS) =    8.41
  EFFECTIVE AREA(ACRES) =     21.86   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.64  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =     21.94       PEAK FLOW RATE(CFS) =      51.31
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 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.) =  16.77
  RAINFALL INTENSITY(INCH/HR) =   2.94
  AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.64
  AREA-AVERAGED Ap =  0.52
  EFFECTIVE STREAM AREA(ACRES) =    21.86
  TOTAL STREAM AREA(ACRES) =    21.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     51.31

****************************************************************************
  FLOW PROCESS FROM NODE    217.00 TO NODE    218.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   995.00
  ELEVATION DATA: UPSTREAM(FEET) =    764.30  DOWNSTREAM(FEET) =    756.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.226
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.002
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        1.71      0.80      0.50    52   16.23
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        1.30      0.27      0.50    86   16.23
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =      7.36
  TOTAL AREA(ACRES) =      3.01   PEAK FLOW RATE(CFS) =      7.36

****************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    220.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  756.50  DOWNSTREAM ELEVATION(FEET) =  750.70
  STREET LENGTH(FEET) =   835.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.78
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.47
    HALFSTREET FLOOD WIDTH(FEET) =   15.53
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.46
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.15
  STREET FLOW TRAVEL TIME(MIN.) =   5.66   Tc(MIN.) =  21.89
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.509
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        5.90      0.80      0.60    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
  SUBAREA AREA(ACRES) =    5.90      SUBAREA RUNOFF(CFS) =   10.79
  EFFECTIVE AREA(ACRES) =      8.91    AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.57
  TOTAL AREA(ACRES) =      8.91        PEAK FLOW RATE(CFS) =      16.81

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  17.34
  FLOW VELOCITY(FEET/SEC.) =  2.63   DEPTH*VELOCITY(FT*FT/SEC.) =   1.33
  LONGEST FLOWPATH FROM NODE    217.00 TO NODE    220.00 =  1830.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 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.) =  21.89
  RAINFALL INTENSITY(INCH/HR) =   2.51
  AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.73
  AREA-AVERAGED Ap =  0.57
  EFFECTIVE STREAM AREA(ACRES) =     8.91
  TOTAL STREAM AREA(ACRES) =     8.91
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.81

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     51.31  16.77    2.944  0.64( 0.34) 0.52    21.9     200.00
```

```
     1     50.81  17.11    2.909  0.64( 0.34) 0.52    21.9     204.00
     2     16.81  21.89    2.509  0.73( 0.41) 0.57     8.9     217.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1     66.86  16.77    2.944  0.66( 0.35) 0.53    28.7     200.00
     2     66.46  17.11    2.909  0.66( 0.35) 0.53    28.9     204.00
     3     59.73  21.89    2.509  0.67( 0.36) 0.54    30.8     217.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     66.86    Tc(MIN.) =    16.77
  EFFECTIVE AREA(ACRES) =    28.68   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.66  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =     30.85
  LONGEST FLOWPATH FROM NODE    217.00 TO NODE    220.00 =  1830.00 FEET.

+-------------------------------------------------------------------------+
| North-East Area                                                         |
|                                                                         |
|                                                                         |
+-------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   830.00
  ELEVATION DATA: UPSTREAM(FEET) =    774.10  DOWNSTREAM(FEET) =    767.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.872
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.164
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        3.73      0.80      0.50    52   14.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA RUNOFF(CFS) =      9.28
  TOTAL AREA(ACRES) =      3.73   PEAK FLOW RATE(CFS) =      9.28

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  767.10  DOWNSTREAM ELEVATION(FEET) =  763.50
  STREET LENGTH(FEET) =   600.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.01
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.47
    HALFSTREET FLOOD WIDTH(FEET) =   15.59
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.29
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.08
  STREET FLOW TRAVEL TIME(MIN.) =   4.36   Tc(MIN.) =  19.24
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.711
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        2.62      0.80      0.50    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    2.62      SUBAREA RUNOFF(CFS) =    5.45
  EFFECTIVE AREA(ACRES) =      6.35    AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =      6.35        PEAK FLOW RATE(CFS) =      13.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  16.22
  FLOW VELOCITY(FEET/SEC.) =  2.34   DEPTH*VELOCITY(FT*FT/SEC.) =   1.13
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    310.00 =  1430.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  19.24
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.711
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        3.75      0.80      0.50    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    3.75      SUBAREA RUNOFF(CFS) =    7.81
  EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =     10.10       PEAK FLOW RATE(CFS) =      21.03

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  19.24
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.711
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        0.93      0.80      0.50    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    0.93      SUBAREA RUNOFF(CFS) =    1.94
  EFFECTIVE AREA(ACRES) =     11.03   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =     11.03       PEAK FLOW RATE(CFS) =      22.96

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    313.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   756.50  DOWNSTREAM(FEET) =   755.20
  FLOW LENGTH(FEET) =   330.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.80
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     22.96
  PIPE TRAVEL TIME(MIN.) =   0.95    Tc(MIN.) =  20.18
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    313.00 =  1760.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    313.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  20.18
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.634
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        3.87      0.80      0.50    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    3.87      SUBAREA RUNOFF(CFS) =    7.79
  EFFECTIVE AREA(ACRES) =     14.90   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =     14.90       PEAK FLOW RATE(CFS) =      29.98

****************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    317.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.20  DOWNSTREAM(FEET) =   754.40
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.80
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     29.98
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =  20.90
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    317.00 =  2010.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 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.) =  20.90
  RAINFALL INTENSITY(INCH/HR) =   2.58
  AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =    14.90
  TOTAL STREAM AREA(ACRES) =    14.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.98

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    316.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   665.00
  ELEVATION DATA: UPSTREAM(FEET) =    774.10  DOWNSTREAM(FEET) =    767.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.256
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.390
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
```

```
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        2.32      0.80      0.50    52   13.26
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA RUNOFF(CFS) =      6.25
 TOTAL AREA(ACRES) =      2.32   PEAK FLOW RATE(CFS) =      6.25

****************************************************************************
 FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  767.70  DOWNSTREAM ELEVATION(FEET) =  763.70
 STREET LENGTH(FEET) =   550.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.80
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.46
   HALFSTREET FLOOD WIDTH(FEET) =   14.91
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.45
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
 STREET FLOW TRAVEL TIME(MIN.) =   3.75   Tc(MIN.) =  17.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.920
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "5-7 DWELLINGS/ACRE"       A        4.88      0.80      0.50    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
 SUBAREA AREA(ACRES) =    4.88      SUBAREA RUNOFF(CFS) =   11.07
 EFFECTIVE AREA(ACRES) =      7.20    AREA-AVERAGED Fm(INCH/HR) =  0.40
 AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =      7.20        PEAK FLOW RATE(CFS) =      16.34

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.50   HALFSTREET FLOOD WIDTH(FEET) =  17.03
 FLOW VELOCITY(FEET/SEC.) =  2.64   DEPTH*VELOCITY(FT*FT/SEC.) =   1.32
 LONGEST FLOWPATH FROM NODE    315.00 TO NODE    317.00 =  1215.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 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.) =  17.00
 RAINFALL INTENSITY(INCH/HR) =   2.92
 AREA-AVERAGED Fm(INCH/HR) =  0.40
 AREA-AVERAGED Fp(INCH/HR) =  0.80
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =     7.20
 TOTAL STREAM AREA(ACRES) =     7.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.34

 ** CONFLUENCE DATA **
  STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
  NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
     1     29.98  20.90    2.579  0.80( 0.40) 0.50    14.9     308.00
     2     16.34  17.00    2.920  0.80( 0.40) 0.50     7.2     315.00

 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     44.53  17.00    2.920  0.80( 0.40) 0.50    19.3     315.00
     2     44.12  20.90    2.579  0.80( 0.40) 0.50    22.1     308.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     44.53    Tc(MIN.) =    17.00
 EFFECTIVE AREA(ACRES) =    19.32   AREA-AVERAGED Fm(INCH/HR) =  0.40
 AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.50
 TOTAL AREA(ACRES) =     22.10
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    317.00 =  2010.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    317.00 TO NODE    325.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   763.70  DOWNSTREAM(FEET) =   752.60
 FLOW LENGTH(FEET) =   445.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.62
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     44.53
 PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =  17.55
```

```
 LONGEST FLOWPATH FROM NODE    308.00 TO NODE    325.00 =  2455.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 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.) =  17.55
 RAINFALL INTENSITY(INCH/HR) =   2.86
 AREA-AVERAGED Fm(INCH/HR) =  0.40
 AREA-AVERAGED Fp(INCH/HR) =  0.80
 AREA-AVERAGED Ap =  0.50
 EFFECTIVE STREAM AREA(ACRES) =    19.32
 TOTAL STREAM AREA(ACRES) =    22.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     44.53

****************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    321.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   650.00
 ELEVATION DATA: UPSTREAM(FEET) =    783.80  DOWNSTREAM(FEET) =    778.90

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.779
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.838
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 A        1.14      0.80      0.10    52   10.78
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
 SUBAREA RUNOFF(CFS) =      3.86
 TOTAL AREA(ACRES) =      1.14   PEAK FLOW RATE(CFS) =      3.86

****************************************************************************
 FLOW PROCESS FROM NODE    321.00 TO NODE    323.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  778.90  DOWNSTREAM ELEVATION(FEET) =  778.70
 STREET LENGTH(FEET) =   395.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  27.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.36
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.53
   HALFSTREET FLOOD WIDTH(FEET) =   18.55
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.74
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.39
 STREET FLOW TRAVEL TIME(MIN.) =   8.92   Tc(MIN.) =  19.70
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.673
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        1.28      0.80      0.10    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
 SUBAREA AREA(ACRES) =    1.28      SUBAREA RUNOFF(CFS) =    2.99
 EFFECTIVE AREA(ACRES) =      2.42    AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =      2.42        PEAK FLOW RATE(CFS) =       5.65

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.54   HALFSTREET FLOOD WIDTH(FEET) =  18.96
 FLOW VELOCITY(FEET/SEC.) =  0.75   DEPTH*VELOCITY(FT*FT/SEC.) =   0.40
 LONGEST FLOWPATH FROM NODE    320.00 TO NODE    323.00 =  1045.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    323.00 TO NODE    325.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   766.70  DOWNSTREAM(FEET) =   752.60
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.89
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      5.65
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  19.74
 LONGEST FLOWPATH FROM NODE    320.00 TO NODE    325.00 =  1095.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    325.00 TO NODE    325.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  19.74
  RAINFALL INTENSITY(INCH/HR) =   2.67
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =     2.42
  TOTAL STREAM AREA(ACRES) =     2.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.65

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     44.53  17.55    2.865  0.80( 0.40) 0.50    19.3     315.00
      1     44.12  21.45    2.540  0.80( 0.40) 0.50    22.1     308.00
      2      5.65  19.74    2.669  0.80( 0.08) 0.10     2.4     320.00

  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     49.93  17.55    2.865  0.80( 0.37) 0.46    21.5     315.00
      2     49.95  19.74    2.669  0.80( 0.36) 0.46    23.3     320.00
      3     49.48  21.45    2.540  0.80( 0.37) 0.46    24.5     308.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     49.95    Tc(MIN.) =    19.74
  EFFECTIVE AREA(ACRES) =    23.30   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =     24.52
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    325.00 =  2455.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    325.00 TO NODE    326.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   752.60  DOWNSTREAM(FEET) =   326.00
  FLOW LENGTH(FEET) =   640.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  49.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     49.95
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =  19.96
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    326.00 =  3095.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  19.96
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.652
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       13.00      0.80      0.50    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =   13.00      SUBAREA RUNOFF(CFS) =   26.37
  EFFECTIVE AREA(ACRES) =     36.30   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =     37.52       PEAK FLOW RATE(CFS) =      74.34

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     76.50  17.76    2.844  0.80( 0.38) 0.48    34.5     315.00
      2     74.34  19.96    2.652  0.80( 0.38) 0.47    36.3     320.00
      3     72.50  21.66    2.524  0.80( 0.38) 0.47    37.5     308.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     76.50  Tc(MIN.) =  17.76
  AREA-AVERAGED Fm(INCH/HR) =  0.38  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.48  EFFECTIVE AREA(ACRES) =     34.47

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  17.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.844
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.00      0.80      0.10    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    4.98
  EFFECTIVE AREA(ACRES) =     36.47   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =     39.52       PEAK FLOW RATE(CFS) =      81.47

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    327.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   750.00  DOWNSTREAM(FEET) =   749.90
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.13
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     81.47
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =  17.90
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    327.00 =  3145.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    327.00 TO NODE    327.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  17.90
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.831
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        1.00      0.80      0.10    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    2.48
  EFFECTIVE AREA(ACRES) =     37.47   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =     40.52       PEAK FLOW RATE(CFS) =      83.52

****************************************************************************
  FLOW PROCESS FROM NODE    327.00 TO NODE    328.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   749.90  DOWNSTREAM(FEET) =   746.40
  FLOW LENGTH(FEET) =   860.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.08
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     83.52
  PIPE TRAVEL TIME(MIN.) =   1.77    Tc(MIN.) =  19.67
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    328.00 =  4005.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    328.00 TO NODE    328.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  19.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.675
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                      A        9.70      0.80      0.60    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
  SUBAREA AREA(ACRES) =    9.70      SUBAREA RUNOFF(CFS) =   19.18
  EFFECTIVE AREA(ACRES) =     47.17   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =     50.22       PEAK FLOW RATE(CFS) =      97.44

****************************************************************************
  FLOW PROCESS FROM NODE    328.00 TO NODE    328.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  19.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.675
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        2.60      0.80      0.10    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    6.07
  EFFECTIVE AREA(ACRES) =     49.77   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =     52.82       PEAK FLOW RATE(CFS) =     103.51

****************************************************************************
  FLOW PROCESS FROM NODE    328.00 TO NODE    329.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   746.40  DOWNSTREAM(FEET) =   746.30
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.55
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    103.51
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =  19.80
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    329.00 =  4055.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN) =  19.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.665
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               A        0.95      0.80       0.10    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA AREA(ACRES) =    0.95      SUBAREA RUNOFF(CFS) =    2.21
  EFFECTIVE AREA(ACRES) =     50.72   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =     53.77       PEAK FLOW RATE(CFS) =     105.26

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    330.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   746.30  DOWNSTREAM(FEET) =   744.00
  FLOW LENGTH(FEET) =   500.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.95
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    105.26
  PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =  20.73
  LONGEST FLOWPATH FROM NODE    308.00 TO NODE    330.00 =  4555.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  20.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.592
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               A        1.65      0.80       0.10    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA AREA(ACRES) =    1.65      SUBAREA RUNOFF(CFS) =    3.73
  EFFECTIVE AREA(ACRES) =     52.37   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =     55.42       PEAK FLOW RATE(CFS) =     105.68

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  20.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.592
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        5.54      0.80       0.50    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.50
  SUBAREA AREA(ACRES) =    5.54      SUBAREA RUNOFF(CFS) =   10.94
  EFFECTIVE AREA(ACRES) =     57.91   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =     60.96       PEAK FLOW RATE(CFS) =     116.62

+----------------------------------------------------------------------------+
| Chino Avenue                                                               |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    524.00 TO NODE    522.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   700.00
  ELEVATION DATA: UPSTREAM(FEET) =    754.20  DOWNSTREAM(FEET) =    751.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.604
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.494
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL               A        0.92      0.80       0.10    52   12.60
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      2.83
  TOTAL AREA(ACRES) =      0.92   PEAK FLOW RATE(CFS) =      2.83

****************************************************************************
  FLOW PROCESS FROM NODE    522.00 TO NODE    522.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  12.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.494
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A        0.78      0.80       0.85    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.85
  SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    1.98
  EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.35
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =      1.70       PEAK FLOW RATE(CFS) =       4.80

****************************************************************************
  FLOW PROCESS FROM NODE    522.00 TO NODE    523.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   820.00
  ELEVATION DATA: UPSTREAM(FEET) =    755.00  DOWNSTREAM(FEET) =    748.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.605
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.671
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.80      0.80      0.10    52   11.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      2.59
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.59

****************************************************************************
  FLOW PROCESS FROM NODE    523.00 TO NODE    524.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  748.20  DOWNSTREAM ELEVATION(FEET) =  747.70
  STREET LENGTH(FEET) =   565.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 32.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  27.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.46
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.53
    HALFSTREET FLOOD WIDTH(FEET) =   18.38
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    0.97
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   9.71   Tc(MIN.) =  21.32
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.549
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.78      0.80      0.10    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA AREA(ACRES) =    0.78      SUBAREA RUNOFF(CFS) =    1.73
  EFFECTIVE AREA(ACRES) =      1.58    AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =      1.58        PEAK FLOW RATE(CFS) =       3.51

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.53   HALFSTREET FLOOD WIDTH(FEET) =  18.49
  FLOW VELOCITY(FEET/SEC.) =  0.97   DEPTH*VELOCITY(FT*FT/SEC.) =   0.51
  LONGEST FLOWPATH FROM NODE    522.00 TO NODE    524.00 =  1385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    524.00 TO NODE    524.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  21.32
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.549
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A        1.37      0.80      0.85    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.85
  SUBAREA AREA(ACRES) =    1.37      SUBAREA RUNOFF(CFS) =    2.31
  EFFECTIVE AREA(ACRES) =      2.95   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =      2.95       PEAK FLOW RATE(CFS) =       5.82

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    518.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   683.00
  ELEVATION DATA: UPSTREAM(FEET) =    758.20  DOWNSTREAM(FEET) =    745.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.136
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.238
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.84      0.80      0.10    52    9.14
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      3.14
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      3.14
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    518.00 TO NODE    518.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   9.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.238
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A        0.56      0.80      0.85    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.85
  SUBAREA AREA(ACRES) =    0.56      SUBAREA RUNOFF(CFS) =    1.79
  EFFECTIVE AREA(ACRES) =      1.40   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =      1.40       PEAK FLOW RATE(CFS) =       4.94

****************************************************************************
  FLOW PROCESS FROM NODE    514.00 TO NODE    516.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   705.00
  ELEVATION DATA: UPSTREAM(FEET) =    760.00  DOWNSTREAM(FEET) =    745.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.148
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.235
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        1.50      0.80      0.10    52    9.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      5.61
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      5.61

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    512.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   600.00
  ELEVATION DATA: UPSTREAM(FEET) =    753.00  DOWNSTREAM(FEET) =    752.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.636
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.070
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        1.50      0.80      0.10    52   15.64
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      4.04
  TOTAL AREA(ACRES) =      1.50   PEAK FLOW RATE(CFS) =      4.04

+----------------------------------------------------------------------------+
| East riverside Drive                                                       |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    502.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   758.00
  ELEVATION DATA: UPSTREAM(FEET) =    774.10  DOWNSTREAM(FEET) =    769.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.773
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.640
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.91      0.80      0.10    52   11.77
  COMMERCIAL                 C        0.39      0.27      0.10    86   11.77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.64
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      4.18
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      4.18

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    502.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.77
  RAINFALL INTENSITY(INCH/HR) =   3.64
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.64
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =     1.30
  TOTAL STREAM AREA(ACRES) =     1.30
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.18

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   452.00
  ELEVATION DATA: UPSTREAM(FEET) =    773.30  DOWNSTREAM(FEET) =    769.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.939
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.294
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.55      0.80      0.10    52    8.94
  COMMERCIAL                 C        0.22      0.27      0.10    86    8.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.65
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      2.93
  TOTAL AREA(ACRES) =      0.77   PEAK FLOW RATE(CFS) =      2.93

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    502.00 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.) =   8.94
  RAINFALL INTENSITY(INCH/HR) =   4.29
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.65
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =     0.77
  TOTAL STREAM AREA(ACRES) =     0.77
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.93

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      4.18  11.77    3.640  0.64( 0.06) 0.10     1.3     500.00
      2      2.93   8.94    4.294  0.65( 0.06) 0.10     0.8     501.00

  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      6.69   8.94    4.294  0.64( 0.06) 0.10     1.8     501.00
      2      6.66  11.77    3.640  0.64( 0.06) 0.10     2.1     500.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      6.69    Tc(MIN.) =     8.94
  EFFECTIVE AREA(ACRES) =     1.76   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.64  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =      2.07
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =   758.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    507.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   572.00
  ELEVATION DATA: UPSTREAM(FEET) =    773.30  DOWNSTREAM(FEET) =    761.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.432
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.447
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        1.11      0.80      0.10    52    8.43
  PUBLIC PARK                A        0.34      0.80      0.85    52   13.40
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.28
  SUBAREA RUNOFF(CFS) =      5.52
  TOTAL AREA(ACRES) =      1.45   PEAK FLOW RATE(CFS) =      5.52
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =      1.45  TC(MIN.) =      8.43
  EFFECTIVE AREA(ACRES) =      1.45  AREA-AVERAGED Fm(INCH/HR)=  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.28
  PEAK FLOW RATE(CFS)   =      5.52
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

D. Hydrologic Soils Group Map
Point Precipitation Frequency, NOAA Atlas 14, Vol. 6, Ver. 2

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Bernardino County Southwestern Part, California (CA677)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Db	Delhi fine sand	A	152.1	74.3%
Hr	Hilmar loamy fine sand	C	52.6	25.7%
Totals for Area of Interest			204.7	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

NOAA Atlas 14, Volume 6, Version 2
Location name: Ontario, California, US*
Latitude: 34.0130°, Longitude: -117.6050°
Elevation: 755 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF tabular | PF graphical | Maps & aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	1.37 (1.14-1.66)	1.81 (1.51-2.20)	2.36 (1.97-2.87)	2.80 (2.30-3.43)	3.37 (2.69-4.28)	3.80 (2.96-4.93)	4.22 (3.22-5.63)	4.66 (3.43-6.38)	5.22 (3.68-7.48)	5.65 (3.85-8.38)
10-min	0.984 (0.822-1.19)	1.30 (1.08-1.57)	1.69 (1.41-2.06)	2.00 (1.66-2.46)	2.42 (1.93-3.07)	2.72 (2.12-3.53)	3.03 (2.30-4.03)	3.34 (2.46-4.57)	3.74 (2.64-5.35)	4.05 (2.75-6.01)
15-min	0.792 (0.660-0.956)	1.04 (0.872-1.26)	1.36 (1.14-1.66)	1.62 (1.33-1.98)	1.95 (1.55-2.48)	2.20 (1.71-2.85)	2.44 (1.86-3.25)	2.69 (1.98-3.69)	3.02 (2.13-4.32)	3.26 (2.22-4.84)
30-min	0.598 (0.500-0.724)	0.790 (0.660-0.958)	1.03 (0.858-1.25)	1.22 (1.01-1.50)	1.48 (1.17-1.87)	1.66 (1.30-2.16)	1.85 (1.40-2.46)	2.04 (1.50-2.79)	2.28 (1.61-3.27)	2.47 (1.68-3.66)
60-min	0.443 (0.370-0.536)	0.585 (0.488-0.709)	0.764 (0.635-0.928)	0.906 (0.746-1.11)	1.09 (0.869-1.39)	1.23 (0.958-1.60)	1.37 (1.04-1.82)	1.51 (1.11-2.06)	1.69 (1.19-2.42)	1.83 (1.24-2.71)
2-hr	0.329 (0.275-0.398)	0.433 (0.361-0.525)	0.563 (0.468-0.684)	0.664 (0.548-0.814)	0.796 (0.634-1.01)	0.892 (0.694-1.16)	0.986 (0.749-1.31)	1.08 (0.796-1.48)	1.20 (0.848-1.72)	1.29 (0.880-1.92)
3-hr	0.274 (0.228-0.331)	0.360 (0.300-0.436)	0.466 (0.388-0.566)	0.549 (0.453-0.673)	0.656 (0.522-0.833)	0.735 (0.572-0.953)	0.811 (0.616-1.08)	0.887 (0.654-1.22)	0.984 (0.695-1.41)	1.06 (0.720-1.57)
6-hr	0.193 (0.161-0.233)	0.253 (0.211-0.306)	0.327 (0.272-0.397)	0.385 (0.317-0.472)	0.459 (0.365-0.583)	0.513 (0.400-0.666)	0.566 (0.430-0.754)	0.618 (0.456-0.847)	0.685 (0.484-0.981)	0.735 (0.500-1.09)
12-hr	0.124 (0.104-0.150)	0.163 (0.136-0.197)	0.211 (0.176-0.257)	0.249 (0.205-0.305)	0.298 (0.237-0.378)	0.334 (0.260-0.433)	0.368 (0.280-0.490)	0.403 (0.297-0.552)	0.447 (0.316-0.640)	0.480 (0.327-0.713)
24-hr	0.082 (0.073-0.095)	0.108 (0.096-0.125)	0.142 (0.125-0.164)	0.168 (0.147-0.196)	0.202 (0.171-0.244)	0.228 (0.189-0.280)	0.252 (0.204-0.318)	0.277 (0.219-0.359)	0.310 (0.234-0.418)	0.334 (0.245-0.466)
2-day	0.049 (0.043-0.056)	0.066 (0.058-0.076)	0.088 (0.077-0.101)	0.105 (0.092-0.123)	0.128 (0.109-0.155)	0.146 (0.121-0.180)	0.164 (0.132-0.206)	0.181 (0.143-0.235)	0.205 (0.155-0.277)	0.224 (0.164-0.312)
3-day	0.035 (0.031-0.040)	0.048 (0.042-0.055)	0.064 (0.057-0.074)	0.078 (0.068-0.090)	0.096 (0.081-0.115)	0.110 (0.091-0.135)	0.124 (0.100-0.156)	0.138 (0.109-0.179)	0.157 (0.119-0.212)	0.172 (0.126-0.241)
4-day	0.028 (0.025-0.032)	0.039 (0.034-0.045)	0.053 (0.046-0.061)	0.064 (0.056-0.074)	0.079 (0.067-0.095)	0.091 (0.075-0.112)	0.103 (0.083-0.130)	0.115 (0.091-0.149)	0.132 (0.100-0.178)	0.145 (0.106-0.202)
7-day	0.019 (0.017-0.022)	0.026 (0.023-0.030)	0.036 (0.031-0.041)	0.043 (0.038-0.051)	0.054 (0.046-0.065)	0.062 (0.052-0.077)	0.071 (0.057-0.089)	0.079 (0.063-0.103)	0.091 (0.069-0.123)	0.100 (0.074-0.140)
10-day	0.014 (0.013-0.016)	0.020 (0.018-0.023)	0.027 (0.024-0.032)	0.033 (0.029-0.039)	0.042 (0.035-0.050)	0.048 (0.040-0.059)	0.055 (0.044-0.069)	0.062 (0.049-0.080)	0.071 (0.054-0.096)	0.078 (0.057-0.109)
20-day	0.009 (0.008-0.010)	0.012 (0.011-0.014)	0.017 (0.015-0.019)	0.021 (0.018-0.024)	0.026 (0.022-0.031)	0.030 (0.025-0.037)	0.035 (0.028-0.044)	0.039 (0.031-0.051)	0.046 (0.035-0.062)	0.051 (0.037-0.071)
30-day	0.007 (0.006-0.008)	0.009 (0.008-0.011)	0.013 (0.012-0.015)	0.016 (0.014-0.019)	0.021 (0.018-0.025)	0.024 (0.020-0.030)	0.028 (0.023-0.035)	0.032 (0.025-0.041)	0.037 (0.028-0.050)	0.042 (0.030-0.058)
45-day	0.005 (0.005-0.006)	0.008 (0.007-0.009)	0.010 (0.009-0.012)	0.013 (0.011-0.015)	0.017 (0.014-0.020)	0.020 (0.016-0.024)	0.023 (0.018-0.028)	0.026 (0.020-0.034)	0.031 (0.023-0.041)	0.034 (0.025-0.048)
60-day	0.005 (0.004-0.005)	0.007 (0.006-0.008)	0.009 (0.008-0.011)	0.011 (0.010-0.013)	0.014 (0.012-0.017)	0.017 (0.014-0.021)	0.020 (0.016-0.025)	0.023 (0.018-0.029)	0.027 (0.020-0.036)	0.030 (0.022-0.042)

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

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

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

NOAA Atlas 14, Volume 6, Version 2
Location name: Ontario, California, US*
Latitude: 34.0130°, Longitude: -117.6050°
Elevation: 755 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF tabular | PF graphical | Maps & aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.114 (0.095-0.138)	0.151 (0.126-0.183)	0.197 (0.164-0.239)	0.233 (0.192-0.286)	0.281 (0.224-0.357)	0.317 (0.247-0.411)	0.352 (0.268-0.469)	0.388 (0.286-0.532)	0.435 (0.307-0.623)	0.471 (0.321-0.698)
10-min	0.164 (0.137-0.198)	0.216 (0.180-0.262)	0.282 (0.235-0.343)	0.334 (0.276-0.410)	0.403 (0.321-0.512)	0.454 (0.354-0.589)	0.505 (0.383-0.672)	0.556 (0.410-0.762)	0.624 (0.440-0.892)	0.675 (0.459-1.00)
15-min	0.198 (0.165-0.239)	0.261 (0.218-0.316)	0.341 (0.284-0.415)	0.404 (0.333-0.496)	0.488 (0.388-0.619)	0.550 (0.428-0.713)	0.611 (0.464-0.813)	0.673 (0.496-0.922)	0.754 (0.532-1.08)	0.816 (0.556-1.21)
30-min	0.299 (0.250-0.362)	0.395 (0.330-0.479)	0.516 (0.429-0.627)	0.612 (0.504-0.750)	0.738 (0.587-0.936)	0.832 (0.648-1.08)	0.925 (0.702-1.23)	1.02 (0.750-1.40)	1.14 (0.806-1.63)	1.24 (0.841-1.83)
60-min	0.443 (0.370-0.536)	0.585 (0.488-0.709)	0.764 (0.635-0.928)	0.906 (0.746-1.11)	1.09 (0.869-1.39)	1.23 (0.958-1.60)	1.37 (1.04-1.82)	1.51 (1.11-2.06)	1.69 (1.19-2.42)	1.83 (1.24-2.71)
2-hr	0.658 (0.550-0.797)	0.866 (0.722-1.05)	1.13 (0.936-1.37)	1.33 (1.10-1.63)	1.59 (1.27-2.02)	1.78 (1.39-2.32)	1.97 (1.50-2.63)	2.16 (1.59-2.96)	2.40 (1.70-3.44)	2.59 (1.76-3.84)
3-hr	0.822 (0.686-0.995)	1.08 (0.900-1.31)	1.40 (1.16-1.70)	1.65 (1.36-2.02)	1.97 (1.57-2.50)	2.21 (1.72-2.86)	2.44 (1.85-3.24)	2.66 (1.96-3.65)	2.96 (2.09-4.23)	3.17 (2.16-4.71)
6-hr	1.15 (0.963-1.40)	1.51 (1.26-1.83)	1.96 (1.63-2.38)	2.30 (1.90-2.82)	2.75 (2.19-3.49)	3.07 (2.39-3.99)	3.39 (2.57-4.51)	3.70 (2.73-5.07)	4.10 (2.90-5.87)	4.40 (3.00-6.53)
12-hr	1.50 (1.25-1.81)	1.96 (1.64-2.38)	2.55 (2.12-3.10)	3.00 (2.47-3.68)	3.59 (2.86-4.56)	4.02 (3.13-5.21)	4.44 (3.37-5.91)	4.85 (3.58-6.65)	5.39 (3.81-7.71)	5.79 (3.94-8.59)
24-hr	1.97 (1.74-2.27)	2.60 (2.30-3.00)	3.40 (3.00-3.94)	4.03 (3.53-4.70)	4.85 (4.11-5.85)	5.46 (4.53-6.72)	6.06 (4.91-7.63)	6.66 (5.25-8.62)	7.44 (5.63-10.0)	8.02 (5.87-11.2)
2-day	2.35 (2.08-2.71)	3.16 (2.80-3.65)	4.21 (3.71-4.87)	5.05 (4.41-5.89)	6.16 (5.22-7.43)	7.01 (5.81-8.62)	7.85 (6.36-9.90)	8.71 (6.87-11.3)	9.86 (7.46-13.3)	10.7 (7.85-15.0)
3-day	2.51 (2.22-2.89)	3.43 (3.03-3.95)	4.62 (4.07-5.35)	5.58 (4.88-6.52)	6.89 (5.83-8.30)	7.89 (6.54-9.70)	8.90 (7.21-11.2)	9.93 (7.83-12.9)	11.3 (8.58-15.3)	12.4 (9.08-17.3)
4-day	2.70 (2.39-3.11)	3.71 (3.28-4.29)	5.04 (4.44-5.84)	6.12 (5.36-7.14)	7.59 (6.43-9.15)	8.72 (7.24-10.7)	9.87 (8.00-12.4)	11.1 (8.71-14.3)	12.7 (9.58-17.1)	13.9 (10.2-19.4)
7-day	3.15 (2.79-3.64)	4.37 (3.86-5.04)	5.97 (5.26-6.91)	7.28 (6.37-8.50)	9.07 (7.68-10.9)	10.5 (8.68-12.9)	11.9 (9.61-15.0)	13.3 (10.5-17.3)	15.3 (11.6-20.7)	16.9 (12.4-23.6)
10-day	3.43 (3.03-3.95)	4.77 (4.21-5.50)	6.54 (5.77-7.57)	8.00 (6.99-9.33)	10.0 (8.46-12.0)	11.5 (9.58-14.2)	13.1 (10.6-16.6)	14.8 (11.7-19.2)	17.0 (12.9-23.0)	18.8 (13.8-26.3)
20-day	4.12 (3.65-4.75)	5.80 (5.13-6.70)	8.05 (7.10-9.32)	9.93 (8.68-11.6)	12.5 (10.6-15.1)	14.6 (12.1-17.9)	16.7 (13.5-21.1)	18.9 (14.9-24.5)	22.0 (16.7-29.7)	24.5 (17.9-34.2)
30-day	4.81 (4.25-5.54)	6.79 (6.00-7.84)	9.48 (8.36-11.0)	11.7 (10.3-13.7)	14.9 (12.6-18.0)	17.4 (14.5-21.5)	20.1 (16.3-25.3)	22.9 (18.0-29.6)	26.8 (20.3-36.1)	29.9 (21.9-41.7)
45-day	5.76 (5.09-6.64)	8.11 (7.17-9.36)	11.3 (9.99-13.1)	14.1 (12.3-16.4)	18.0 (15.2-21.7)	21.1 (17.5-26.0)	24.4 (19.8-30.8)	28.0 (22.0-36.2)	33.0 (24.9-44.5)	37.0 (27.1-51.7)
60-day	6.71 (5.94-7.74)	9.37 (8.29-10.8)	13.1 (11.5-15.1)	16.2 (14.2-18.9)	20.8 (17.6-25.0)	24.5 (20.3-30.1)	28.4 (23.0-35.8)	32.6 (25.7-42.2)	38.7 (29.2-52.1)	43.6 (31.9-60.8)

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

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

Please refer to NOAA Atlas 14 document for more information.

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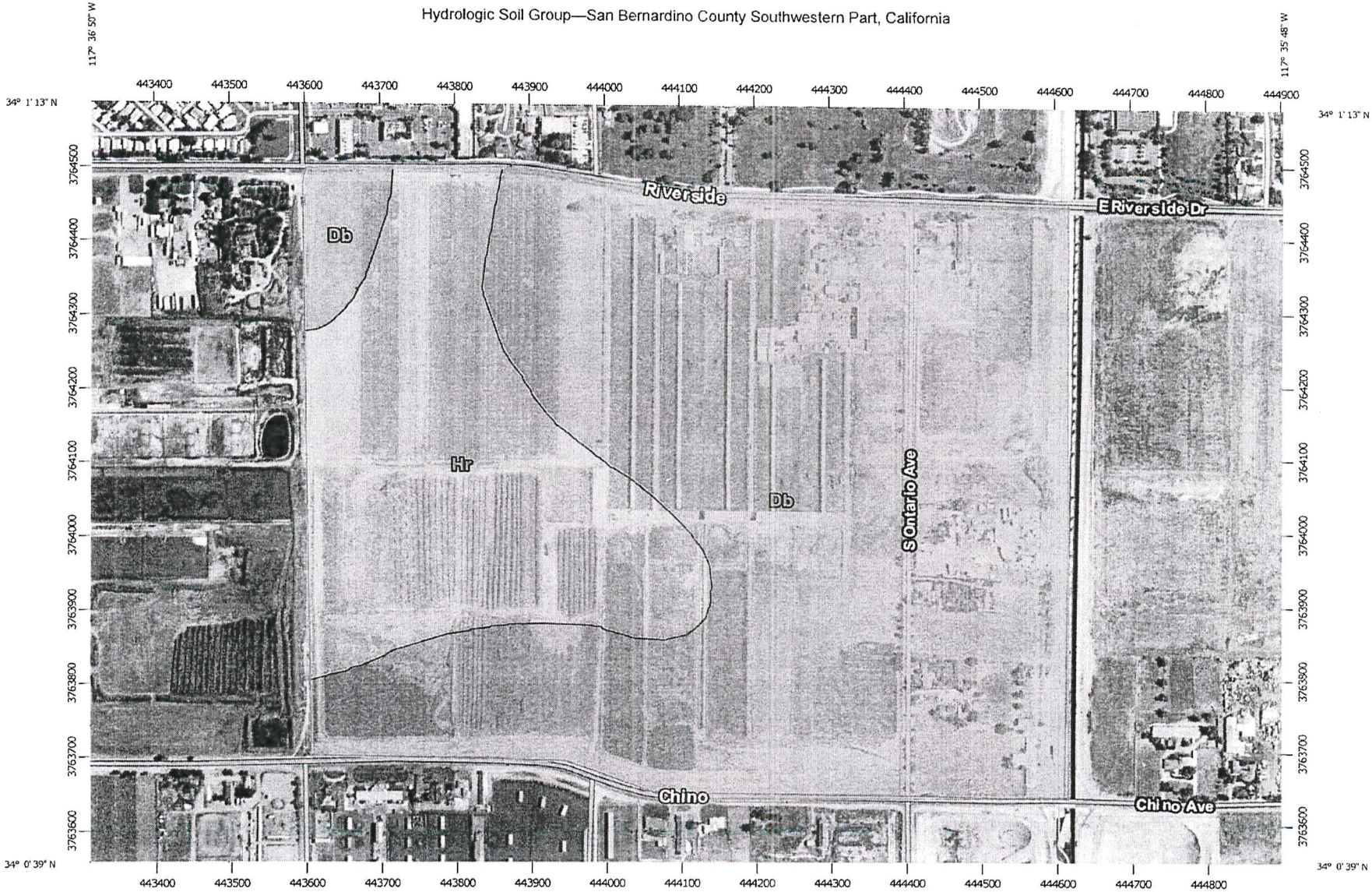
PF graphical

Hydrologic Soil Group—San Bernardino County Southwestern Part, California



Map Scale: 1:7,260 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

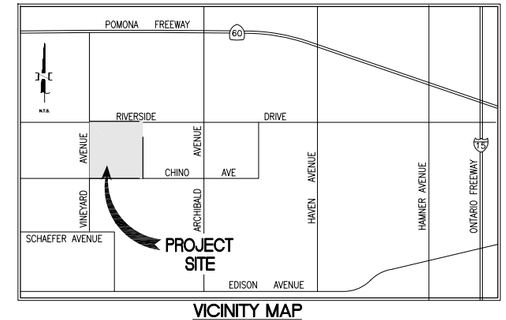
Soil Survey Area: San Bernardino County Southwestern Part, California
Survey Area Data: Version 6, Sep 26, 2014

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

Date(s) aerial images were photographed: May 3, 2010—Jul 3, 2010

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

DATE:	NO.	REVISIONS



VICINITY MAP
N.T.S.

LAND USE

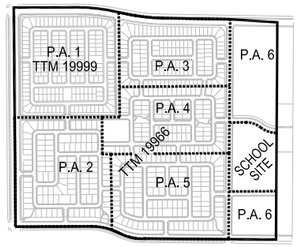
			LOT COUNT
P.A. 1	80x50	(4,000 SF)	192 LOTS
P.A. 2	65x105	(6,825 SF)	113 LOTS
P.A. 3	50x90	(4,500 SF)	125 LOTS
P.A. 4	55x95	(5,225 SF)	114 LOTS
P.A. 5	60x100	(6,000 SF)	128 LOTS
P.A. 6			
	SCHOOL SITE		
			672 LOTS TOTAL

TTM 19966 PARK TABLE

LOT "A"	0.36 AC PARKLET	
LOT "B"	0.36 AC PARKLET	
LOT "C"	0.37 AC PARKLET	
SUBTOTAL	1.09 AC	
LOT "A"	0.50 AC PARKLET	
LOT "B"	0.28 AC PARKLET	
SUBTOTAL	0.78 AC	
LOT "A"	0.48 AC PARKLET	
LOT "B"	0.48 AC PARKLET	
SUBTOTAL	0.96 AC	
LOT "A"	0.30 AC PARKLET	
LOT "B"	0.31 AC PARKLET	
SUBTOTAL	0.61 AC	
ARMSTRONG PARK	2.06 AC PARK	
	5.50 AC TOTAL	
	3.67 AC REQUIRED	

PARCEL OWNERS

P.A. 1 - NELSON PARCEL
P.A. 2 - CV COMMUNITIES
P.A. 3 - CV COMMUNITIES
P.A. 4 - CV COMMUNITIES
P.A. 5 - CV COMMUNITIES



PLANNING AREAS

PREPARED FOR:

CV Communities

PREPARED BY:

MDS CONSULTING — HORSE SCHULTZ — 17320 Redhill Ave. Suite 300 Irvine, CA 92614 Voice: 949-251-8821 FAX: 949-251-0514 — PLANNERS ENGINEERS SURVEYORS

DATE PREPARED: NOVEMBER 04, 2015

TENTATIVE TRACT NO. 19966
SITE PLAN
DE BOER PARCELS
ARMSTRONG RANCH SPECIFIC PLAN

NEW MODEL COLONY
CITY OF ONTARIO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

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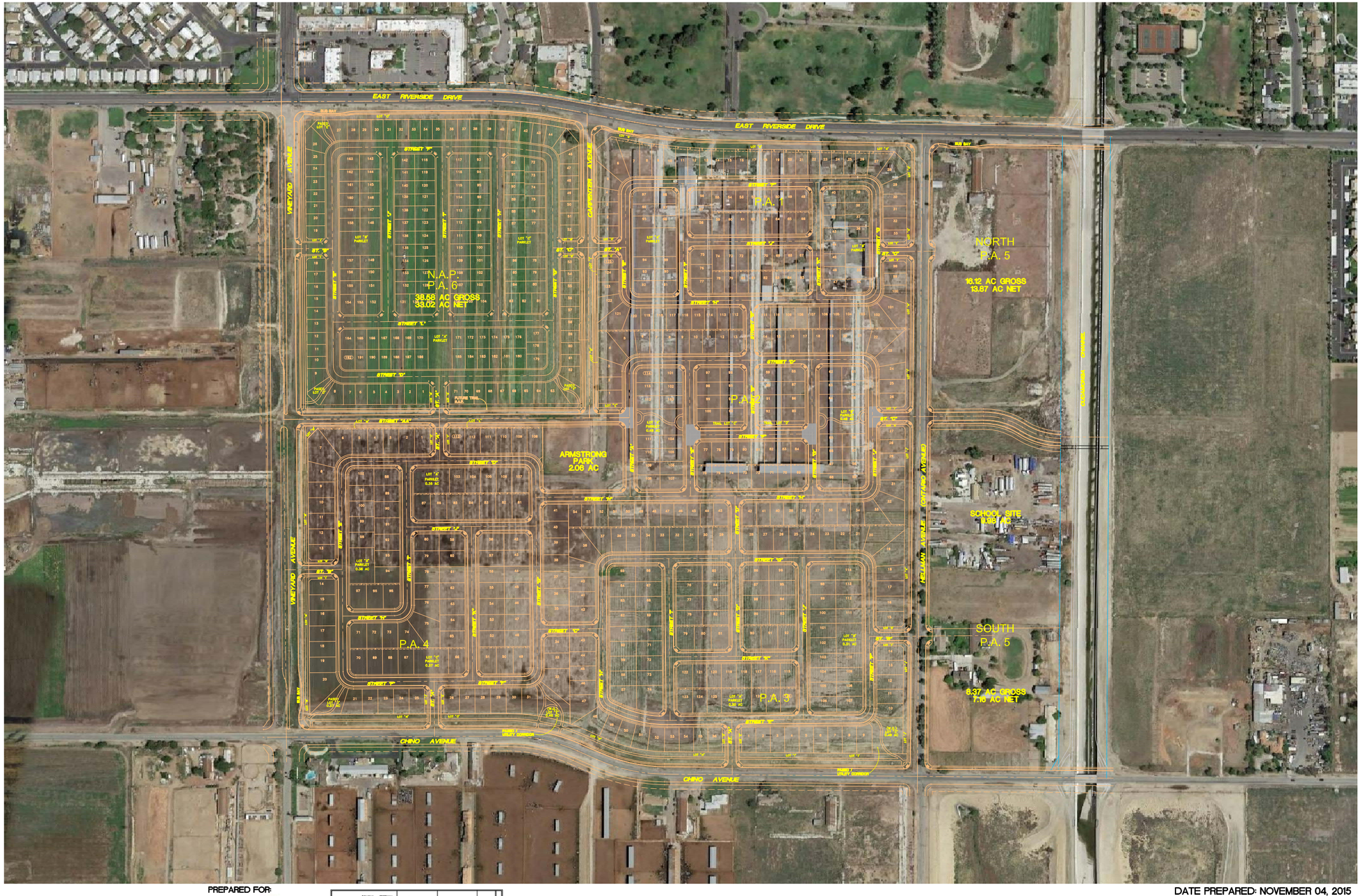


PREPARED FOR:

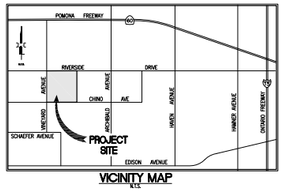
CV Communities

PREPARED BY:

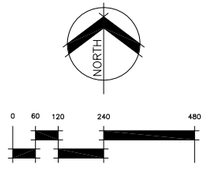
MDS CONSULTING — MORSE SCHULTZ — 17320 Redhill Ave., Suite 350, Irvine, CA 92614, Voice: 949.251.8822, FAX: 949.251.8816

PLANNERS ENGINEERS SURVEYORS

DATE:	NO.	REVISIONS



VICINITY MAP
N.T.S.



I-156

DATE PREPARED: NOVEMBER 04, 2015

TENTATIVE TRACT NO. 19966
ALT. PARK SITE - AERIAL EXHIBIT
DE BOER PARCELS
ARMSTRONG RANCH SPECIFIC PLAN

NEW MODEL COLONY

CITY OF ONTARIO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

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EXISTING 72" STORM DRAIN
RIVERSIDE STORM DRAIN

EAST RIVERSIDE DRIVE

BUS BAY

VINEYARD AVENUE

TTM 19999
P.A. 1
38.58 AC GROSS
33.02 AC NET

EXISTING 120" STORM DRAIN
RIVERSIDE STORM DRAIN

P.A. 3

CARPENTER AVENUE

NORTH
P.A. 6
16.12 AC GROSS
13.87 AC NET

ARMSTRONG PARK
2.06 AC

P.A. 4

HELLMAN AVENUE (ONTARIO AVENUE)

SCHOOL SITE
9.98 AC

P.A. 2

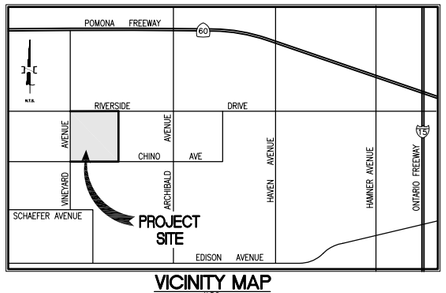
P.A. 5

SOUTH
P.A. 6
8.37 AC GROSS
7.16 AC NET

EXISTING 144" STORM DRAIN
RIVERSIDE STORM DRAIN

CHINO AVENUE

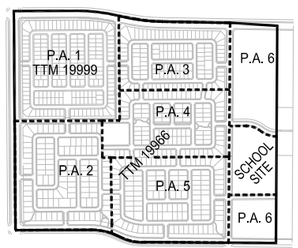
LOWER CUCAMONGA SPREADING GROUNDS (SBCFCD)



VICINITY MAP
N.T.S.

NORTH

0 150 300 600



PLANNING AREAS

PREPARED FOR:

CV Communities

PREPARED BY:

MDS CONSULTING
NORSE SCHULTZ
17320 Redhill Ave. Suite 350 Irvine, CA 92614
Voice: 949-251-8821
FAX: 949-251-0516
PLANNERS ENGINEERS SURVEYORS

DATE PREPARED: NOVEMBER 14, 2015

TTM 19966 AND 19999
EXISTING S.D. EXHIBIT
ARMSTRONG RANCH SPECIFIC PLAN

NEW MODEL COLONY
CITY OF ONTARIO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

I:\80350\PRELIM\EXISTING-SD.dwg 11/04/15

EXISTING 72" STORM DRAIN
RIVERSIDE STORM DRAIN

EAST RIVERSIDE DRIVE

PROPOSED
STORM DRAIN

BUS BAY

VINEYARD AVENUE

TTM 19999
P.A. 1
38.58 AC GROSS
33.02 AC NET

P.A. 3

NORTH
P.A. 6
16.12 AC GROSS
13.87 AC NET

CARPENTER AVENUE

EXISTING 120" STORM DRAIN
RIVERSIDE STORM DRAIN

ARMSTRONG
PARK
2.08 AC

P.A. 4

HELLMAN AVENUE (ONTARIO AVENUE)

42" STORM DRAIN
CHN-X6.2
(CITY MASTER PLAN)

SCHOOL SITE
9.98 AC

P.A. 2

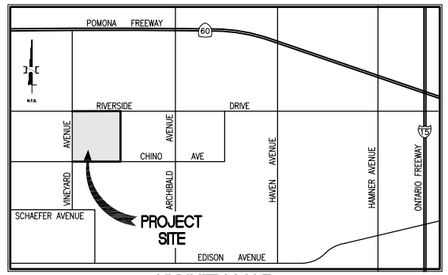
P.A. 5

SOUTH
P.A. 6
8.37 AC GROSS
7.16 AC NET

EXISTING 144" STORM DRAIN
RIVERSIDE STORM DRAIN

CHINO AVENUE

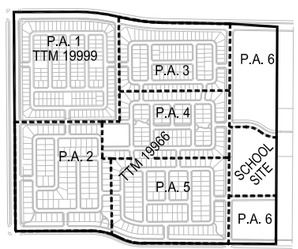
LOWER CUCAMONGA
SPREADING GROUNDS
(SBCFCD)



VICINITY MAP
N.T.S.

NORTH

0 150 300 600



PLANNING AREAS

PREPARED FOR:

CV Communities

PREPARED BY:

MDS CONSULTING — MORSE SCHULTZ
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FAX: 949-251-0816
PLANNERS ENGINEERS SURVEYORS

DATE PREPARED: NOVEMBER 14, 2015

TTM 19966 AND 19999
PROPOSED S.D. EXHIBIT
ARMSTRONG RANCH SPECIFIC PLAN

NEW MODEL COLONY
CITY OF ONTARIO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

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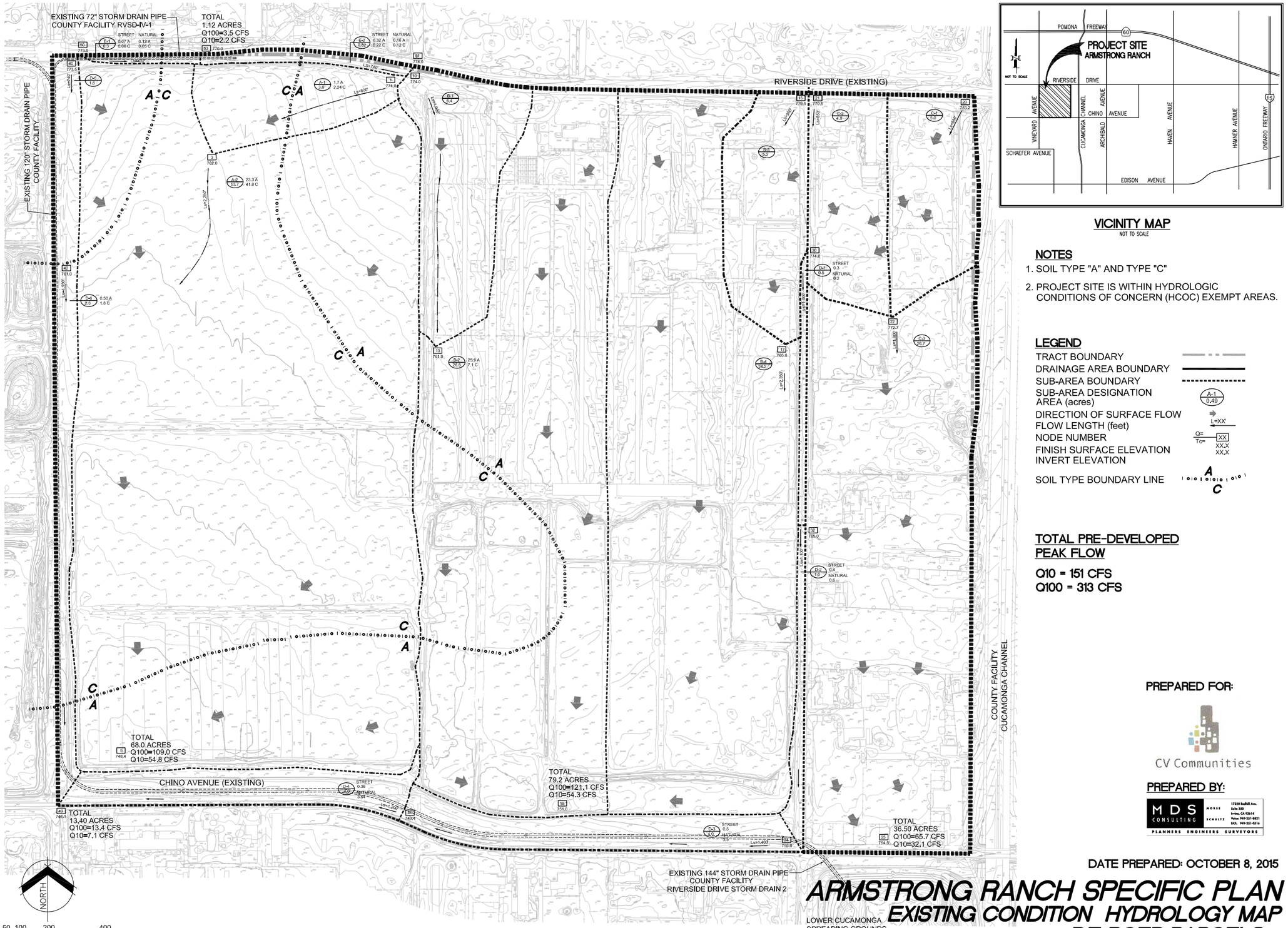

VICINITY MAP
NOT TO SCALE

NOTES

1. SOIL TYPE "A" AND TYPE "C"
2. PROJECT SITE IS WITHIN HYDROLOGIC CONDITIONS OF CONCERN (HCOC) EXEMPT AREAS.

LEGEND

- TRACT BOUNDARY
- DRAINAGE AREA BOUNDARY
- SUB-AREA BOUNDARY
- SUB-AREA DESIGNATION AREA (acres) — A-1 / 0.49
- DIRECTION OF SURFACE FLOW FLOW LENGTH (feet) — L=XX'
- NODE NUMBER — Q= / Tc= XX / XX.X / XX.X
- FINISH SURFACE ELEVATION INVERT ELEVATION
- SOIL TYPE BOUNDARY LINE — A / C

TOTAL PRE-DEVELOPED PEAK FLOW

Q10 = 151 CFS
Q100 = 313 CFS

PREPARED FOR:

CV Communities

PREPARED BY:

MDS CONSULTING
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17320 Redhill Ave. Suite 350
Irvine, CA 92614
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FAX: 949-251-8816
PLANNERS ENGINEERS SURVEYORS

DATE PREPARED: OCTOBER 8, 2015

ARMSTRONG RANCH SPECIFIC PLAN
EXISTING CONDITION HYDROLOGY MAP
DE BOER PARCELS

NEW MODEL COLONY
CITY OF ONTARIO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

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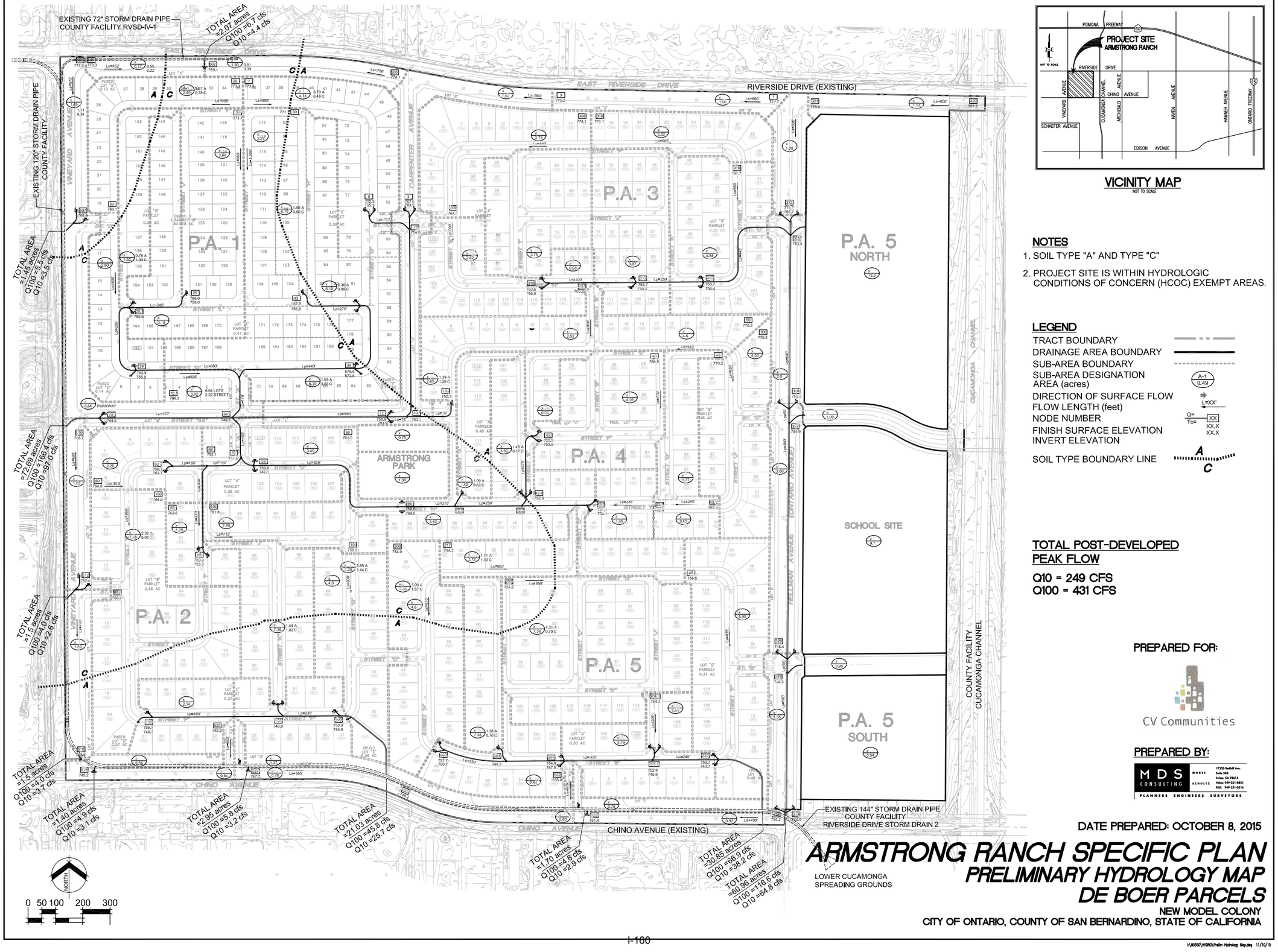

VICINITY MAP
NOT TO SCALE

NOTES
1. SOIL TYPE "A" AND TYPE "C"
2. PROJECT SITE IS WITHIN HYDROLOGIC CONDITIONS OF CONCERN (HCOC) EXEMPT AREAS.

LEGEND
- TRACT BOUNDARY
- DRAINAGE AREA BOUNDARY
- SUB-AREA BOUNDARY
- SUB-AREA DESIGNATION AREA (acres) — A-1 / 0.49
- DIRECTION OF SURFACE FLOW FLOW LENGTH (feet) — L=XX'
- NODE NUMBER — Q= / Tc= XX / XX.X / XX.X
- FINISH SURFACE ELEVATION INVERT ELEVATION
- SOIL TYPE BOUNDARY LINE — A / C

TOTAL POST-DEVELOPED PEAK FLOW
Q10 = 249 CFS
Q100 = 431 CFS

PREPARED FOR:

CV Communities

PREPARED BY:

MDS CONSULTING
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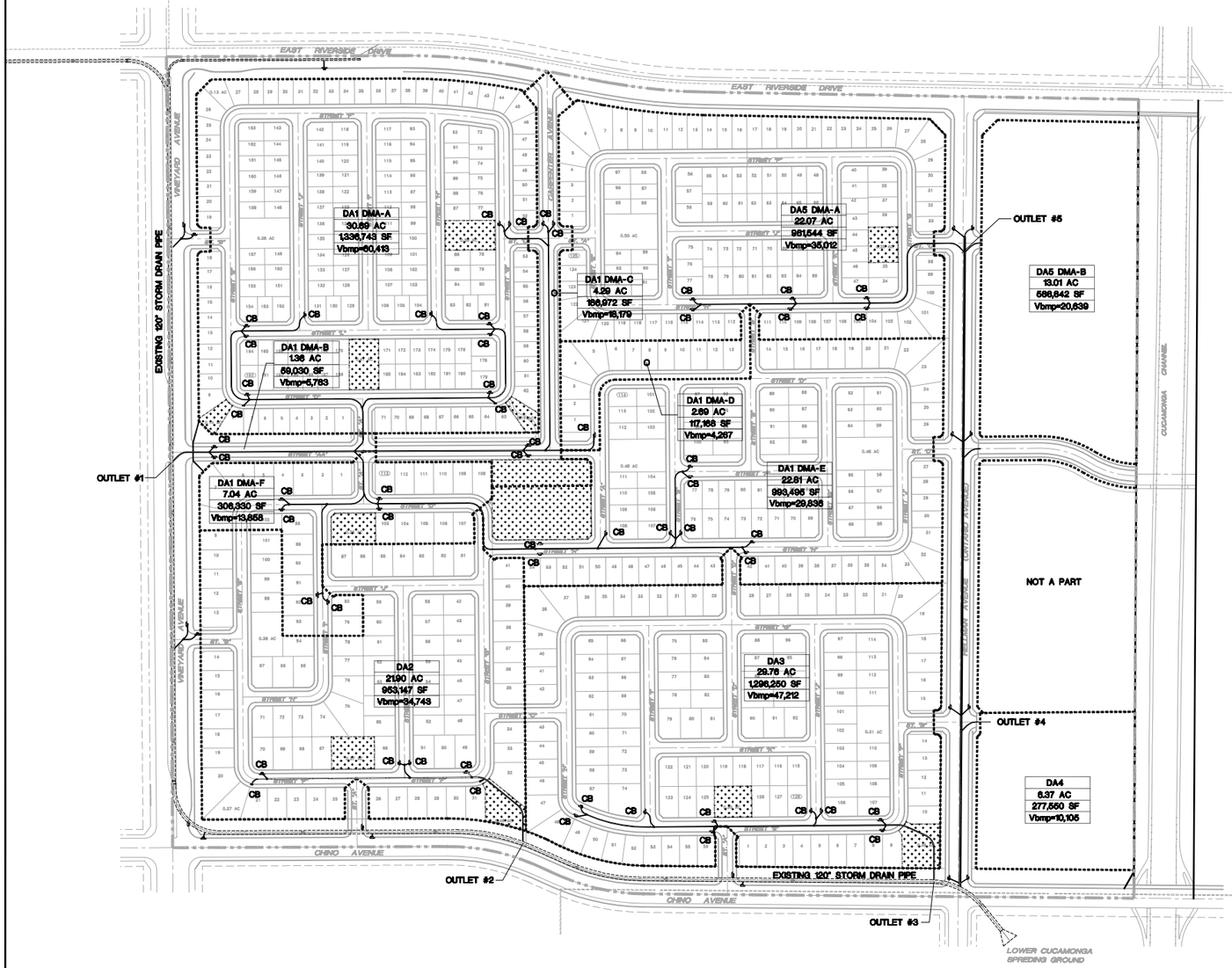
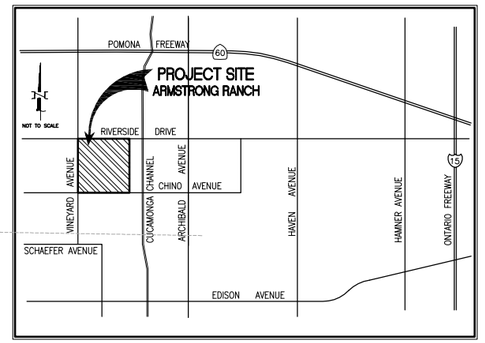
PLANNERS ENGINEERS SURVEYORS

DATE PREPARED: OCTOBER 8, 2015

ARMSTRONG RANCH SPECIFIC PLAN
PRELIMINARY HYDROLOGY MAP
DE BOER PARCELS
NEW MODEL COLONY
CITY OF ONTARIO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

L:\80350\HYDRO\Prelim Hydrology Map.dwg 11/16/15





VICINITY MAP
NOT TO SCALE

LEGEND

- PROJECT BOUNDARY
- DRAINAGE AREA BOUNDARY
- DA1 / DMA-A — DRAINAGE AREA / DRAINAGE MANAGEMENT AREA
- 13.01 AC — AREA IN ACRES
- 566,842 SF — AREA IN SQUARE FEET
- Vbmp= 13,000 — VOLUME BMP IN CUBIC FEET
- LOCATION OF UNDERGROUND INFILTRATION BASIN

PREPARED FOR:

CV Communities

PREPARED BY:

MDS CONSULTING — MORSE SCHULTZ
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PLANNERS ENGINEERS SURVEYORS

DATE PREPARED: OCTOBER 2015

ARMSTRONG RANCH SPECIFIC PLAN

PRELIMINARY WQMP
DE BOER PARCELS

NEW MODEL COLONY
CITY OF ONTARIO, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

NORTH

0 50 100 200 400

I:\80350\HYDRO\Pwqmp.dwg 10/12/15